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**NEWS IN BRIEF**

**Job cut fears  
at Plessey**

FEARS of redundancies at Plessey's factories in the North West were aroused when management called a special meeting for yesterday (Wednesday). Full-time officials and stewards were invited to attend from several unions including ASTMS and the electricians' union, the EETPU.

**Exclusive agents**

AN EXCLUSIVE wholesale agency agreement has been signed between Partec and Compelco for the distribution of the MITS Altair range of small business systems in the UK and Eire. As part of the agreement, Compelco is to expand its support activities for the range, and is soon to move its headquarters from Kilburn, London, to a 5,000 square foot facility in Old Church Street, in Chelsea.

**Name change**

THE refurbishing centre near Heathrow is the last division of Telex to start using the Memorax name after the takeover in January (CW, January 20).

**Computers exempt**

COMPUTERS were exempt until 1987 from an EEC free trade directive, which took effect from Saturday. All public authorities must allow any firm within the community to tender for contracts worth over £130,000.

**Dol to announce £20m scheme for micros**

AN INTERIM £15-£20 million scheme to support the application of microprocessors is due to be announced this week by the Department of Industry.

The scheme has been developed over the last six months (CW, February 16) as a means of encouraging British industry to develop applications of microprocessor chips. It was originally thought that, at the time of formal announcement, it would have a level of financial support similar to the microelectronics manufacturing scheme, which the National Economic Development Office says should now total £240 million, with some £80 million coming from the Dol.

This week's announcement, however, will be for an interim support scheme, intended to generate a quick interest in the area.

Further extensions to the expansion of the scheme are expected to be announced in the future.

There will be three main strands to the support scheme. The first will be to promote an awareness in industry of the ways in which microprocessors can be used. This educational exercise is seen by the Department as being most important to the scheme's success.

The second strand will be subsidised feasibility and consultancy studies of general application areas, while the third will be financial support for specific projects.

**Burroughs set to launch a fast ROM**

By Keith Jones

A READ only memory with a very fast access time and complete non-volatility looks like being introduced soon by Burroughs following a manufacturing licence agreement signed with Energy Conversion Devices of Troy, Michigan, the firm that developed the amorphous semiconductor material on which it is based. The manufacturing agreement is the second between Burroughs and ECD. Under the first, signed in 1975, Burroughs took over the development of the Onvonic memory.

The Onvonic memory has a read time of the order of 15 nanoseconds, requires no refresh pulse, is bit by bit alterable and can be reprogrammed electrically.

The development of amorphous semiconductor technology has been pursued with great dedication since the early sixties by Stanford Ovshinsky, boss of ECD (CW, July 21, 1977). Apart from Burroughs, it is now being taken very seriously by 3M which is using amorphous material in the form of film in the Microvonic file. This holds microfilms with frames that can be changed individually at any time.

Amorphous semiconductor film could also have great potential as a means of converting sun light directly into electricity. It is considerably cheaper than the crystalline semiconductor material used in conventional electronics.

Ovshinsky's financial backers include powerful Japanese business interests and William Simon, former Secretary of the US Treasury.

**Chubb runs down Gross and designs new range**

AFTER taking over Gross Cash Registers about 18 months ago, Chubb and Son has run down virtually the whole of the once thriving Gross marketing operation overseas and is designing a new range of electronic cash registers to replace the existing unsuccessful Gross equipment.

Gross made a pre-tax loss of £1.7 million in the 14/15 months between being taken over and the end of Chubb's last financial year at the end of March, and accounted largely for a fall of more than £500,000 in Chubb's overall profits, compared with the previous year.

A Chubb spokesman told Computer Weekly that Gross was "going back to the drawing board" to redesign completely its electronic cash register range and aimed to introduce the new equipment within the next 18 months. He said that the plan was to start near the bottom of the price/performance range with kit that could directly replace existing electro-mechanical Gross registers, and then move up to sophisticated online point of sale systems.

The Chubb spokesman added that the Gross marketing operation in Australia was now being run on a "care and maintenance" basis, the Italian subsidiary had been sold, the French subsidiary had gone into liquidation, and sales in the US were now "very small".



A CONFERENCE on computer fraud is to be held on board the liner Queen Elizabeth II on her crossing to New York from September 20 to 25. The two speakers at the conference will be Michael Corner, author of the book "Corporate Fraud," and Peter Hamilton, security consultant with Chubb.

Delegates will return by air. The conference will consist of evening lectures on such subjects as the nature of computer risks, case studies, and defensive strategies. There will be informal question and answer sessions, and a minicomputer for demonstrations.

The conference is organised by Peter Holmes of 20th Century Security Education, Leatherhead. Attendance costs £700; further information from Leatherhead 74808.

According to the information we received, a special t-shirt has been produced for the occasion, to be issued to all delegates. The picture, however, is described as showing Peter Holmes with the conference speakers.

Far be it from us to suggest this is improbable!

**Fibre optic link for Distriol Line**

TWO developments have been announced which underline the revolutionary potential of fibre optics in telecommunications.

GEC's Telephone Cables Ltd subsidiary has been awarded a contract by London Transport to supply and install a seven kilometre fibre optic link along the District Underground line, between Earl Court and Acton stations.

In the US, Univac has installed a fibre optic link between the Houston City Library and the city's Management Information Systems Centre. The link connects five Computer-Assisted Data Entry (CADE) terminals with the computer centre.

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## DOWNTIME

by Chad

### Where to place the UK memory plant

MUCH has been made of the fact that blunt northern English place names seem to doom to disaster the NEB's jolly plan for an all-British semiconductor memory plant. Certainly the euphonious Spanish names in Silicon Valley — Cupertino, Palo Alto, Santa Clara — are difficult to match. Even Sunnyvale somehow sounds a nicer place than Port Sunlight.

But a glance at the map shows that there are in fact several splendidly appropriate locations to be found in and around the "trial north," even if Mosley is ruled out as being too far south.

Moss Side, Manchester, can certainly put in a reasonable claim for consideration, while Holme Moss has delightfully cosy echoes of the dark days when Britain stood alone amid the gathering gloom.

Critics of the whole plan insist that only RAMsbottom brings out the true utility of the project, but on balance I prefer the quiet optimism expressed in the name RAM-shope, which is to be found at the foothills of the Cheviots in Northumberland.

## Automating by degrees

Do you ever get the feeling that you can't get away from computers anywhere these days? I was at the Degree Show of the Royal College of Art, as unlikely a place for mechanical thinking as one could imagine; but sure enough, our ubiquitous trade raised its head in several places.

One graphics student was working on the design of characters on VDUs, using elaborate home-made electronic models. Another had produced a set of large colour display characters for Ceefax, and had

studied the problems of laying out Ceefax pages effectively.

An industrial designer had made a full-scale mock-up of a combined VDU and printing terminal, with the printer sitting in front of the screen and swinging out of the way in an ingenious manner when not required.

As might be expected, in the Design Research Department there were descriptions of theoretical studies about "computer modelling and gaming being important tools in the participation of a criti-

cally insightful activist lady in enhancing environmental awareness..." Social Science waffle is ubiquitous too.

The rest of the Show, by the way, was the most amazing collection of graphic designs, ceramics, glass, textiles, furniture, and industrial designs, highly original and produced with exquisite care. There was a complete set of spoof World Cup stamps, complete with first day cover depicting two footballers embracing à la Rodin, which the Post Office humbly turned down for public use.

## The spice of conference life

THE Services Congress at Barcelona was a refreshing chance for my reporter to get up-to-date with the latest American slang. For instance, he discovered that those called on the programme "Accompanying Persons" (in former sexist days, "Wives") are known at conferences in the US as "Spice".

Spice is the plural of Spouse, get it?

He also picked up some gems of conference double-talk, much of it, let it be known, from non-Americans.

A Frenchman giving a paper about bureaux hit by competition from microcomputers kept talking about "negative growth".

Best deliberate crack of the Congress came from the president of MSA Inc, J. P. Imlay, who hails from Jimmy Carter country — Atlanta, Georgia. He described how he had been made responsible for getting the President's brother Billy to the Inauguration. Said he, "We had terrible trouble getting hold of a bullet-proof mule."

# NCC sponsors US programming project

WHEN competitive systems consultants and software houses combine the management, marketing and technical skills of their senior staff, something exciting is the motivator. The Interlock export project is precisely this. Aimed initially at the vast US market on an offshore programming basis, it is sponsored by the National Computing Centre and has been developed in conjunction with six systems houses, selected from among over 60 tenders for their complementary export experience.

The NCC went out to tender for the preliminary work necessary to get the project off the ground in April last year. Work by the main participating companies, Altergo and Peat Marwick Mitchell with the project manager from Data Logic, now acquired by the Raytheon-Coscor group, was supplemented on a consultancy basis by contributions from Data Skill, F International and Pactel.

In a chicken and egg situation, the NCC had the difficult task of planning a market drive in the US while not knowing the



Steve Shirley, director of F International, has been acting in a consultative role to the National Computing Centre's Interlock scheme for the export of programming, to the US. Here, she describes one such scheme, sponsored by the NCC, which has been developed in conjunction with six systems houses. Altergo, Peat Marwick Mitchell, Data Logic, Data Skill, Pactel, and F International. Consequently, a drawing board project has crystallised into a working proposition and the UK now has a specific remote programming service to offer American clients.

package of services which the Interlock team was going to come up with as feasible. Not surprisingly, six participants meant six initial reactions on most points. Surprisingly, however, members talked freely about their export experiences, approach to programming

assignments, contracts and much which is normally classed as stock-in-trade. Agreement can be reached with amazing speed when top professionals approach a problem with a common aim. Indeed the opportunity to plan properly a disciplined approach to offshore programming, with the very real prospect of sizeable US contracts being obtained in future years perhaps less than 1878, even overcame any reservations about speaking so freely among ones competitors. The calibre and mature personality of the project leader from Data Logic, Robin Williamson, was, and still is, a significant factor in binding the team together.

For in the interim months, a drawing board project has crystallised into a working proposition — the UK now has a specific remote programming service to offer American clients — and indeed the first success was a \$20,000 a year software consultancy contract awarded to Altergo last year (CW January 5).

The working proposition has several quite distinct components. Firstly, a fully documented "control manual" setting out mandatory procedures, minimum procedures and guidelines as to the flow of information between US clients and UK supplier via control centres.

The control manual, a technical working document supplemented by marketing literature, is itself impressively comprehensive. In over 200 pages, it covers most expected eventualities from the US client's definition of requirements to the UK supplier's delivery of the operational solution.

Probably the most important section is concerned with the control centres within the client's and supplier's organisation. Each such centre, under a designated project controller, co-ordinates the flow of information to ensure that the parties on either side of the Atlantic are working on a common information base and avoid the pitfalls of misunderstanding of requirements and activities which can jeopardise the success of any project.

A further key concept implicit in the control centres is the maintenance of information on project progress throughout, and the monitoring of achievement against defined milestones. Nothing radical, nothing new. Yet how often do major projects go awry because the simplest of project control techniques have not been applied. Interlock programming places great emphasis on proper planning and monitoring of all activities.

The second component is the marketing effort under the aegis of the NCC via selected agents in the US, primarily management consultancies, which know the US market, are known in it and often have clients seeking implementation of their recommendations.

Implementation of data processing projects in the US is a phenomenally expensive process, mainly due to the high salaries paid, and indeed needed, in a country with both a high cost of living and high standard of living. UK costs when working remotely are, of course, much lower although the management and communications overheads are necessarily high. So gross margins have to be meticulously controlled.

For while the current dollar sterling rates hold, offshore programming via Interlock offers significant cost advantages as well as assured quality to US clients. Interlock's prime advantage, however, is not cost but the quality control of the service by the NCC over and above the high standard of work regularly produced by the UK service industry.

So what is the NCC involvement likely to offer? It is tied into audit procedures, again well documented in standard format and Americanised in style by a true-born American.

The audit activity is designed to yield regular snapshots of each project plus notes as a guide to the next audit. It includes the financial status of the project, a check that the management mechanisms are fully operational, security in all its many aspects, vetting of the supplier's control centre, regarding facilities such as telex, and checks that the project files are complete, minutes of meetings filed appropriately and a host of details to check on staff morale, progress reporting and, of course, technical quality checks.

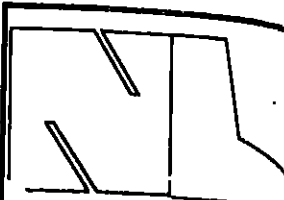
In practice, as in most auditing, an overall check is expected to be made first and then only if the auditor has reason to investigate further, does he, or she, focus on to areas of great detail.

NCC's Interlock thus protects the client from closure of the supplier.

Registration of would-be participating companies based in the UK will depend on satisfying criteria similar to those required for ordinary membership of the CSA. The NCC will itself appraise each firm before formal registration and possibly also on each annual renewal.

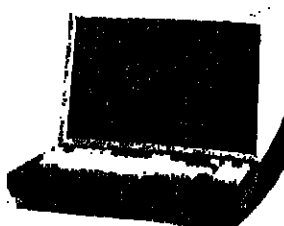
Participating firms, selected by size and requisite experience only, quote independently and competitively on each tender. The contractual arrangement is finally between the selected supplier and the client, the NCC retaining an impartial role as monitor.

The enthusiasm of the six companies working on the project has been quite amazing. All have injected significant management and technical effort even after the formal contract awarded by the NCC was successfully completed on time. Now the Interlock ball lies firmly in the NCC's court.



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## GILB'S MYTHODOLOGY

### Automatic correction of simple input errors should be the norm



WE think we are advanced with our online interactive terminals. Yet one of the main excuses for the interactive technology is the ease with which simply input keying errors can be corrected immediately, while the source document is still present, or the telephone contact is still on the line.

Personally, I would maintain that the use of human operators to correct any errors which are easily correctable by computer logic, is a misuse of human beings. It is not productive. It does not speed throughput. It is not economic. It is not reliable.

I believe that most common errors can be fully automatically corrected. I am speaking about errors such as the random and accidental keying of a single character or misinterpretation of a single character, which accounts for about 80% of the typical errors.

I find very few systems which actually practice automatic correction of any sort. I find that the typical systems designer has received no training in the subject, has no experience in the subject, and is not required by his management to do such things. The fact that such techniques work and have done so for years in some installations, does not bother him in the slightest.

One prerequisite for automatic correction is the same as with automatic correction using parity bits. We must design more redundancy into the input. There are many ways to do so, such as humanised codes (John JONES, SURREY), such as checkwords (23456-JONEJ), repetition (2345IO-2345JO) or even multiple check digits.

This brings us to the next issue. The use of a file to enable us to make corrections is a critical prerequisite for most practical correction attempts. Further, we need the direct access capability of looking around via different search

keys, at sequential or similar groups, and at random.

We need to be able to match input data (such as a payment amount of 235.85) coming in with faulty identifiers against similar (billed 235.85) data on the file. This use of additional data elements in the input, and matching exactly or approximately against the file data is a powerful tool in confirming a correction hypothesis, or selecting the most probable alternative from among several possible corrections.

Any attempt to do automatic correction without making use of this additional data related to the faulty data element, will

be unnecessarily difficult.

The exact logic or correction procedures follows naturally for an examination of the common sense human correction procedure. It is important, however, to recognise from the outset that the objective is rarely "perfect correction of all errors". A more realistic objective is to automate the bulk of all common corrections, leaving the really difficult ones for human attention.

Sometimes we apparently do correction of errors by the simple trick of ignoring the "errors" when they occur at the end of a concept. We can do so in some cases because we have carefully designed the

codes to be unique in the first few characters. The use of longer codes is really only for readability in these cases, and experienced operators may quickly drop redundant parts of the codes.

I'm sure that some concerned readers are worried about the costs of doing all these wonderful things. If they were to go deeper in the literature or look at some practical experience, then it would become clear that the initial development costs are minor, and all costs of automation are quickly repaid.

The myth that you cannot correct input automatically needs to be unlearned.

#### LETTER TO GILB'S MYTHODOLOGY

### Why verification is necessary

I REFER to Tom Gilb's Mythology entitled "Verification Dead - Almost" (CW, June 15). My reply is "Verification not yet extinct - but an endangered species".

In international banking, where extremely high value funds transfer transactions are processed in real time, it is not at all uncommon, particularly in the latest minicomputer-based, dedicated processor applications, to find carefully designed key-verification techniques incorporated. This is not, in my view, a sign of "lack of imagination or of training of the designer" as Tom Gilb glibly claims, but quite the opposite.

In Citibank, which is certainly not renowned for its lethargy in keeping pace with technology nor for its lack of imagination in systems development, verification is still sometimes used. Conversational, program-driven, error-repelling data validation techniques are, in selected instances, supplemented by

verification of certain critical data fields by a second, independent key station.

As an alternative, and to avoid pointless re-keying, by reference to the same source document - which only ensures that the second keyer has faithfully transcribed a possibly incorrect source document - certain transactions are keyed just once but released only after independent, slight verification and authorisation ensure that key elements of the accepted data are in accordance with the original, authorised, customer instructions.

In the final analysis, as I am sure Gilb would agree, there are some "errors" - whether accidentally or deliberately caused - which can, even today, best be detected by the human eye. For example a £1 million Swift transfer due to one account holder could, by a simple keying error, be credited to another (valid) account.

In an age where such tran-

sactions cause funds to be made instantly available in other continents, the highest levels of transaction security are justified. Such modifications, together with errors in setting up critical standing data, would be difficult to prevent or detect by any of Gilb's 13 listed alternatives, other than number 12 (let the customer spot the error) which would certainly not earn a great deal of respect (or future business) from the plaintiff client.

To conclude, verification - as a means of providing error detection is, in most instances, out-performed in terms of effectiveness per pound spent by the more sophisticated error-repelling controls now available to the designer of online systems. However, in terms of fraud prevention/detection, and particularly in certain low volume/high risk applications it still has a justifiable place.

RONALD J. WARMINGTON  
London

## SOFTWARE FILE-1

### Hardware economy in DME option for ICL 2972s, 2976s

FURTHER details have been given by ICL on the new facility which enables a 2960 order code processor to be combined with one of the new 2972 or 2976 systems (CW, June 15).

The facility enables those users converting to a large 2900 under VME/B to economise on hardware by getting rid of their 1900 or System 4 hardware at once. By installing a 2960 order code processor, which costs about £188,000, users can run unconverted applications under DME on their 2972 or 2976 configuration.

This is possible because the 2960, 2972, and the new version of the 2976 all use the same store access and store multiple access controllers and the same main memory. A 2960 processor installed alongside a 2972 or new 2976 can thus be allocated a portion of the resources of the host configuration.

In this way, the configuration can be running VME/B and DME simultaneously, though the two systems are at all times functionally independent.

As the VME/B workload grows, users can switch an increasing portion of the storage

subsystems (SACs, SMACs, discs) from the 2960 to the 2976 processor.

In line with many manufacturers, ICL restricts the extensive use of microcoding to its smaller machines, the 2950 and 2960, opting to hard-wire the large 2970 and 2980 systems.

The benefits of DME, a highly efficient microcoded emulator, have thus been denied so far to 297X users, who have had to make do with Meep. A software emulation facility, Meep, is much less efficient, is appropriate only for small workloads and is not attracted very little use.

The new option to attach a 2960 order code processor offers a significantly easier path to 2900 conversion than was available before and should help considerably to increase the appeal of the larger 2900s.

Interestingly, the announcement coincided with the release of DME+, an enhanced version of DME 1900 for the 2960, which offers a 25% improvement in performance (CW, June 15). However, nothing seems forthcoming for 2970, older version 2976, and 2980 users, who are stuck with Meep.

### Transaction monitor for DG minis from Leasco

A TRANSACTION processing monitor has been developed by Leasco Software to run on Data General minicomputers under the RDS operating system.

Called MRTMS (Mini Real Time Monitor System) the first copy of the software has been installed on a Nova 3 at a bureau in Amsterdam.

MRTMS supports re-entrant application modules written in a specially designed programming language. Offering high-level language features integrated with DG macro assembler, this language is said to combine efficiency with ease of use.

In common with most purpose-designed TP systems, the monitor includes terminal

control and security features and a built-in restart and recovery routine.

The software also provides a file manager, intended to protect database integrity, and full soft routines for hardware and software errors.

An interesting feature of the monitor is its provision of a training mode. Designated terminals will in this mode simulate live system responses without updating application files.

Leasco has installed MRTMS at the Amsterdam bureau operated by Storkdata, the computer services subsidiary of the Vmf-Stork group.

Following this first site, it is to supply a complete real-time sales and purchasing system based on MRTMS to another Stork company, Stork Werkspoor Diesel.

This system, based on a 44X Nova 3, will eventually support 15 VDUs, five printers, and a database of around 80 Megabytes.

Leasco's work for Storkdata follows a co-operation agreement signed by the two companies in April of this year.

#### Bureau taken over

THE Chichester-based bureau and software house, Jackson Associates, is to buy Scope Computer Services, Southern Construction's bureau. The sale will include an NCR Century 1A will provide Southern Construction with a bureau service, as well as systems design and programming for Southern's minicomputer, which will eventually replace the bureau service from Scope.

#### Leads office

TO support its increasing customer base in the North, Megabyte, the Leeds-based real time computer suppliers have opened new offices in Leeds at Kerry House, Kerry Street, Horforth, Leeds LS18 4AW. Tel: 0532 553605.

## SOFTWARE FILE -2

### Intensive format for delegates

AN annual event, the Inter-University Computing Colloquium brings together representatives from both computer science and computer services departments throughout the UK.

Attended this year by over 200

delegates, the three-day colloquium is valued chiefly as an opportunity to exchange ideas. Intensive in format, the programme this year included nearly forty papers on topics ranging from microprocessors to regional computer networks.

### Language-orientated research is main concern

THE predominant concern at Lancaster University, host to this year's Inter-University Computing Colloquium, is language orientated research.

The university is probably best known for the development

of a Pascal system for Data General's Nova minicomputer. Based on the Pascal P compiler, this software has been distributed to around 100 sites worldwide.

The heart of the system is a P-code interpreter, which is

written in Nova assembler and occupies about 2K of memory. The system in addition includes a monitor program, written in Algol, and a Pascal program, for assembling blocks of P-code.

Designed for Novas without hardware multiply divide or floating point features, the software runs under RDS and is intended for a minimum 32K environment. Although both the compiler and user programs are executed interpretively, execution speeds are in general comparable with those of programs processed by Data General's Algol compiler.

The system is distributed, at nominal cost, by Lancaster University in the UK and Europe, and in the US by Gamma Technology at Palo Alto.

Work is also under way at Lancaster on a general theory of languages, both programming and natural. Led by Professor Higman, this effort is in part directed at advances in compiler writing, possibly leading eventually to a "natural" programming language.

One unusual project is the development of a language,

Blazon, for text processing and picture reconstruction. This has been applied to the generation of heraldic devices from definitions of the constituent symbols.

Other work at Lancaster, also involving the development of a language, includes a project on information retrieval from library type structures, and the application of finite state automata theory to the design of communication systems.

Lancaster is to take delivery of an ICL 2960 early next year. Replacing a 1905F, the new machine will form part of the North-west Universities' Regional Network, which currently includes mainframes and communications equipment at the computer centres of Lancaster, Liverpool and Salford.

#### Trebled its sales

OVER 80 sales of the TPS teleprocessing monitor in the last year have helped Telecomputing to treble its annual turnover. Results to the end of September are expected to show revenue of £1.2m for the year as opposed to £398,000 for last year.

## 'Mathematical content is underestimated' - Dijkstra

PROFESSOR Edsger Dijkstra, renowned for his original thinking on structured programming, spoke last week at Lancaster of the inherent difficulty of the programming task.

"The analysis of the programming task as carried out over the last 10 years has shown it to be more difficult than we thought," he said.

This recognition began at the 1968 Nato conference at Garmsch, when the 'software crisis' first openly emerged. From that moment, programming methodology became an explicit topic of concern.

"The only fruitful way I can now regard programming is as a branch of applied mathematics. And when all is said and done, it is one of the more difficult branches, as it also implies a knowledge of engineering."

Professor Dijkstra noted that he was not unique in concluding that the mathematical content of programming had been underestimated. One who shared his views, for example, was Professor David Gries of Cornell University.

Professor Dijkstra emphasised that he was not referring to mathematical programming or numerical methods. Nor was he referring to a mathematical "bag of tricks", vast areas of which were irrelevant to a pro-

grammer.

Implying that what he had chiefly in mind was the mathematical expression of program requirements, Professor Dijkstra was speaking primarily in the context of the use of invariants.

Earlier in the day, Professor Dijkstra had devoted most of his formal address to the use of invariants in developing algorithms. This he clearly regarded as a key technique in the development of evidently correct software.

In response to a query on the application of such techniques by people of lesser ability, Professor Dijkstra said that the connection between mathematics and programming had never been refuted. But it had been very widely rejected for its unattractive social consequences.

"Of the enormous number of programmers in the world, a large proportion was lured into the profession when the demands it has to make were grossly underestimated. This has been a source of personal tragedy for many many people."

He added, however, that although over the last 10 years his greatest disappointment had been in this area, there were now signs that programming quality was rising steadily.

### Methods 'too abstract' taunt for Professor

PROFESSOR Dijkstra's reverence for the abstract and his scorn for mechanical aids led more than one delegate to describe his approach as "Zen and the art of software".

His practice in general, he said, was to delay committing ideas to paper till as late as possible. This discipline, he suggested, offered one the best chance of mastering complex material as well as avoiding mistakes.

On the use of terminals, he said: "I never prepare my programs at a terminal because it is too easy to correct mistakes. Any medium which makes it easy to correct mistakes, encourages mistakes."

### Advantages of using cheap micros in campus networks

CAMPUS networks, usually thought of as providing a local "ring main" of computing power, were a topic of universal interest at Lancaster.

Most of the attention focussed on the use of cheap microprocessors in such networks, either as network nodes or as switching devices.

Much of the attraction of such a network is economic, as minimum configuration "personal" systems can share occasional access to more powerful processors and peripherals elsewhere in the network.

A well-received presentation on such a system was given by John Buxton, of Warwick University. He described the

"For this reason, online systems should, I think, penalise stupid mistakes by increasing the reaction time a little after each error is made."

In a similar vein he argued that compilers, while implementing as many checks as possible, should stop as soon as the first syntax error has been found.

The austerity of some of Professor Dijkstra's ideas, particularly on formal design methods, prompted one member of the audience to question their relationship to the real world.

"I have learned to regard statements about the real world as an invitation not to challenge someone's tacit assumptions," Professor Dijkstra replied.

Implementation of a telephone-like network, in which each node could dial up any other, was a topic of universal interest at Lancaster.

A TMS 9800 microprocessor had been used in this system as the switching computer, initially linking a PDP-11/34 and several 11/03s - the latter equipped just with floppy disc. The system was eventually to be extended to connect about 15 other machines, including a Burroughs B6700.

Other delegates expressed interest in using modems in conjunction with the internal telephone system to implement the network. The approach, they noted with pleasure, would leave them free from interruption while they were connected.

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## PROGRAMMER NOTES

### Labour costs force employers to look for predictability

OVER the past few years computing has emerged from a fine art to a non capital-intensive industry where the major cost is now people.

This minor revolution has made hardware so inexpensive in proportion to people costs that now management wants different programming skills from five years ago.

Generally an applications programmer will not now be recruited for his skill of cutting three milliseconds off the timing of an algorithm. What the manager wants now is predictability. Predictability has two aspects: speed and, arguably less important, quality. Basic quality requirements would be that a system works, but efficiency, when there is computer time to waste, is less important. In the words of one business systems programmer, "manager efficiency takes more time,

whereas my aim is to meet deadlines at a profit."

So, for many managers, a trainee who can produce a working program within the given time period, albeit with a few minor bugs to be ironed out, is just as valuable as an established programmer. But trainees apart, what qualities and experience is the successful candidate likely to have?

Sex discrimination is out. One manager even thought: "promoting a woman's job". To be fair, he was felt that women tended to be more consistently prone to flashes of inspiration and hard work.

The successful job applicant is likely to have proven experience. Ideally the candidate will have followed a project from inception to completion and be familiar with those parts

he was not even directly involved with writing.

The essential quality is a logical approach. After all it should take just a few weeks to retain a good programmer in the basics of a new language; the subtleties can be learnt with time. But too many programmers still think that with two years of Cobol programming, a job-market is their oyster.

A short flow-chart test at the interview will pick out the programmer who's only learnt a simplistic problem-solving approach - rather than the true programmer who is relied on to contribute ideas and to fully organise his own code.

The candidate who claims Cobol, or other language experience, should be asked a few trick questions - eg. should switches or data comparisons be used in a Cobol program?



OP SPOT

# Opcomm undeterred by lack of support

WHEN Opcomm arrived on the operations scene last February, there seemed every possibility that it would develop into an organisation capable of raising the status accorded to operations staff.

But the Coventry-based group has experienced difficulty both in terms of recruitment and persuading its members to attend meetings on a regular basis.

Can the group solve these problems and go on to fulfil its considerable potential, or is it always to consist only of a small band of operators who have sufficient drive to carry on with little support?

The latter now seems the more likely answer, after a talk I had with Russ Bevan and John McGinn, following a meeting held at Lanchester Poly in Coventry last week.

Bevan said, "We now have a hard core of half a dozen or so members who come to every meeting, and others who attend now and again."

Searching for reasons for the poor attendance, he continued: "The fact that operators have to work shifts doesn't help matters, but perhaps we have been too slow in putting ourselves forward."

Its first project was to carry out a survey, commissioned by Computer Weekly, into the computer room environment. This involved contacting over 40 sites in and around the Coventry area.

At present the group is engaged in formulating what it considers to be a training programme necessary for all operators. Much of the work is being carried out by Dave Charles, a shift leader at the Warwick University site.

In that regard, John McGinn said, "Admittedly, progress has been a bit slow at times, but great care is necessary if we are to produce something of quality."

"We want to stress that operator training and career progression are interrelated."

The group is also greatly interested in microcomputers and the effect they may have on the role of operations staff in the industry.

Said McGinn, "We are very interested in how they might alter the work performed by operators."

Recently the group has contributed to a book on computing which is to be published later this year.

So Opcomm is very active and, in spite of its size, has a lot of experience in terms both of time spent in operations and the operating systems used.

"Together we have knowledge of all the most widely used mainframes," said McGinn. He continued: "In addition, we have a lot of other people who are interested in what we are doing, but are unable to attend our meetings because they live too far away."

## HINT OF THE WEEK Use macro to save typing

THE use of macros in the ICL George 3 environment is the subject of a hint sent by Terry Stevens, a shift leader at the Brighton site of the University of Sussex.

He says, "By using macros, the operator can save himself a lot of typing when he is responding to system requests."

According to Stevens, when a job running under George 3 requires a printer to be engaged, or allocated, it will give the operator the following message:

PLEASE ENGAGE UNIT U14

If the operator is unable to allocate the printer, for example, because of a paper wreck, he must type in the following reply:

CD ENGAGE UNIT U14

Says Stevens, "To save typing this in every time a macro should be used." He gives the following example:

INPUT : MACROS, CD14  
CD ENGAGE UNIT U14  
EX

Says Stevens, "Once this has been done, the operator has only to type in 'CD14'."

He also points out that macros may be put to good use in relation to the alignment of pre-printed stationery. For example, to ensure that the line-up of pay slips is correct, the system might give out the following message:

SALARIES, PAYRUN, ARE PAYS LIPS ALIGNED OK?

In response, the operator must enter the following:

SALARIES, PAYRUN, YES OR NO

He puts forward the following macro:

INPUT: MACROS, PAY  
AN: SALARIES, PAYRUN, % A  
EX

Says Stevens, "After this has been added to the macrofile, the operator has only to type 'PAY Y (or N)'."

## Away from noise and bustle

WHILE visiting the Swindon installation of W. H. Smiths, I was very impressed with the rest room provided for the operations staff. In addition to the room itself, there is an area where food can be prepared and cooked.

In my opinion, all sites should provide such facilities so that the operators can spend their breaks well away from the noise of the computer room, particularly during the evening and night shifts.

However, too many sites fail to pay attention to this matter, with the result that the operators are forced to visit the local public house in order to get a break.

What facilities are provided at your site? Op Spot would like to hear from you in this regard.

## Perks, essentials—where should the line be drawn?

"OUR control room staff work a 7am to 4pm, 1pm to 7pm shift pattern over a five-week period and receive a 7½ per cent shift allowance."

"The operators get a 17 per cent allowance for working a three-shift rota. For this my senior operator—who has over four years' operations experience—gets a basic wage of about £80 per week."

So writes a shift leader in response to an Op Spot piece in which I attempted to outline some ways in which the wage paid to operations staff might be linked to the work carried out by them.

In this regard he says: "Now, I do not work for a company in private industry, and the workload is pretty uniform with a fair amount of spare machine time."

"However, this does not mean that we are allowed to terminate the night shift when the work is completed. Instead, we have to wait until the day shift arrives, even though there is nothing to hand over to them."

Meeting operators from other installations has made him view his own site in an even poorer light. He continues: "Speaking to engineers and operators from other sites, I realised that some operators get 'perks'. These sometimes include training schemes, cheap mortgages, a rest room, cooking facilities, club rooms, and others."

"We, on the other hand, are not even considered to be essential car users and therefore cannot get car loans."

He concludes in a manner which sums up the mood of the letter. "At this point, you are probably wondering why the installation is manned at all. Speaking for myself, I suppose I have got into a comfortable rut and my family enjoys the area in which we live."

Well, unfortunately his description fits too many installations. I consider some of the things he refers to as "perks" as being essential in the lives of computer operations staff. Let's consider some of them.

Rest rooms. Last week in Op Spot I said that operators must have a place to which they can escape from the noise of the computer. I still hold that view.

Cooking facilities. These are essential for staff working on the evening and night shifts. Snacks from a vending machine are all right, but are no substitute for cooked meals.

Training schemes. It goes without saying that training is vital if staff are to function at an optimum level and have a decent chance of career progression.

Reduced mortgages. Many financial concerns provide these for staff who are married and over a certain age. In my view such "concessions" give the company a hold over the employee.

Club rooms. While I do not consider these to be essential, I do feel that they provide a pleasant break for staff, particularly those working the evening and night shifts.

Finally I would like to consider some of his other comments: those on car loans and remaining on site during the night shift even though all the work has been completed.

Well, if operators working shifts are not essential car users, I do not know just who does fall into that category. Too few sites consider the problems staff face in getting to and from the installation.

I can see no point in making the whole shift stay on site once the work has been completed, although one or two of the staff must stay behind to hand over the day shift. The shift leader should be in a position to draw up a rota so that everyone takes a turn in carrying out this task.

Operators often complain that nobody listens to their point of view. Well, Op Spot is listening and Bernard Allen would like to hear your opinions and ideas on all matters relating to computer operations.

Your letters should be sent to Op Spot, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU. Telephone calls are equally welcome and Bernard can be contacted directly on 01-281 8035.

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# PO test service ready to go live

THE two GEC 4082 minicomputers which will soon form the basis of the Post Office Prestel test viewdata service, went live last Wednesday. After three days of testing, the computers were handed over to information providers on Monday for databases to be updated and, as soon as this is completed, the test service will be switched from the 4080s at Martlesham to the 4082s at Gresham Street, London.

Sets for the first 50 users, who are due to go onto the system by the end of the year, have now been received by the Post Office and the first six of these, installed in selected homes, are currently being serviced by the research installation at Martlesham. The first 50 lucky users have been nominated by the television manufacturers.

A copy of the Martlesham database was transferred to Gresham Street in mid-August, and has not been updated since. Information providers, therefore, need to bring their pages up-to-date before the system goes live to users.

It had been hoped to get the Gresham Street centre on the air sooner, but delays were caused by teething troubles with the software, which has been enhanced with several additional features including access charge data.

The information providers have now responded to the Post Office's proposals for the scale of charges once the service goes public next year (CW, August 17). The information providers regarded the initial Post Office proposals as unacceptably high, and a compromise acceptable to both sides is likely to be reached within the next few weeks.

Bell-Northern Research of Canada is working on a rival to the Post Office Prestel viewdata system. Called Videotex, the Canadian system is to be given a market trial in 1980. A variant is under development which would allow users to send messages to each others' TV sets without going through the central computer.

## Agency to show off British products

A NEW agency selling UK-made terminals and microcomputer systems under its own name will be exhibiting its product range publicly for the first time at the Institute of Directors on September 29.

The firm, Computrade of Leatherhead, was set up by consultant Tim Wickes to market equipment from British manufacturers who do not have large enough sales staffs to give wide coverage.

Featured at the exhibition will be a desk-top portable computer system based on the Digital Equipment LSI-11 processor, with the name Compact 5. Other products on show will be portable hard-copy terminals and VDUs.

In addition to selling manufacturers' existing product lines, Computrade also designs new systems based on these, adding extra features to units, combining hardware from different sources, and encouraging firms to co-operate to make new enhanced products.

Computrade buys equipment in bulk from manufacturers (British where possible) receiving appropriate discounts, and either sells it itself or appoints other agents around the country. Many small UK manufacturers, Tim Wickes points out, have only one or two salesmen, and thus have difficulty competing against big overseas firms even when their product is superior.

"To build a strong British computer industry," he says, "we have to go into the international markets and meet the foreign competition head-on and sell. This is our major aim." Otherwise, he adds, there is a danger that the UK computer industry could go the way of the motorcycle business.

Anyone who would like to visit Computrade's exhibition should telephone, Claire Hanks, on 03723-77374.

## H-P offers System 35

OFFERING an alternative to minicomputers for high speed computation and instrumentation, Hewlett-Packard has introduced a desk-top computer, the System 35, that adds assembler language facilities to the basic programming provided by the existing H-P System 45 desk-top machine.

The performance of the System 35 is also enhanced by a random access memory that can be expanded to 256K bytes.

The System 35 lacks the graphic display and reporting capabilities of the System 45 but comes with an alphanumeric VDU and a 16-character thermal strip printer.

The assembler is a plug-in ROM-based option not available on the System 45 and enables System 35 to be used to process inputs at high speed from a variety of devices via a selection of I/O interface cards. These include RS-232-C, real time clock, 18-bit duplex, BCD and plotter cards.

The System 35 comes with four slots into which ROM modules holding the assembler and the required I/O controllers can be inserted.

The module for assembling and executing programs costs £1,200, but H-P can also supply an execute-only module for £350. This module should be attractive to system house clients who want to sell machines that can execute their software while preventing their customers from modifying it.

The smallest version of the System 35, with 64K bytes of RAM and a 217K byte magnetic tape cassette unit, costs £8,468 with a VDU or £8,749 with a 32-character single line display.

## Stock control at PoS

A POINT-OF-SALE system, based on a micro, which uses virtual memory techniques has been introduced by Ego Computer Systems primarily for stock control applications in the motor trade.

Already about £100,000 worth of orders have been received by Ego and some interest has been shown by British Leyland.

Built around the Motorola M6800 microprocessor, the system is stand-alone and in its simplest form consists of the processor, with a minimum of 32K disc storage, a specially designed VDU, and a printer.

The system was developed at the London Sports Car Centre, which is owned by Peter Ridge, who is also chairman of Ego Computer Systems.

The emphasis placed on the system is one of low-cost; the standard system being priced at £8,750 including user software. Storage available ranges from 32K up to 12.5 Mbytes.

The VDU has been designed for easy operation by unskilled users and two keyboards are available. One is the standard Qwerty style layout and the other is based on the normal ABC sequence.

Typical information that the Ego system can handle includes part numbers, prices, stock listings, records, invoicing, sales analyses, and re-ordering.

Software is written in Ego-originated assembler but development of a Basic program is under way, as the company is intending to promote the system as a general PoS package.

## Crash progress

VERY encouraging performance of its ICL 2980 and a smooth transition to the SX27 release of VME/B have been reported by the Edinburgh Regional Computing Centre in its newsletter for September.

In the four-week period ending in August, the system achieved a meantime between hardware crashes of 27.8 hours and a meantime between software crashes of 18 hours.

## Experts meet to combat crime

A THREE-DAY conference entitled Science and Security dealing with possible scientific solutions to security problems was held in Brighton last week.

The conference, attended by about 150 delegates, was opened by ex-Premier, Sir Harold Wilson, who visited a number of exhibition stands set up in conjunction with the conference.

Organised jointly by the Institute of Physics and the Electrical Research Association, the conference included 40 papers from scientists and security experts from the police, the government, universities, computer installations and the security industry.

These papers were presented under nine section headings and among these were intruder detection and alarm, encryption, explosive hazards, and access control.

The photograph on the left shows Sir Harold Wilson talking to staff on the Flexion Engineering stand.



## Computel link-up

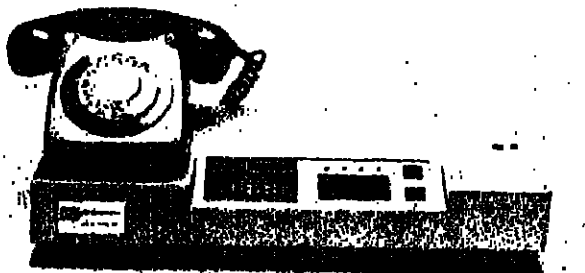
THE deal between the Central Electricity Generating Board and Computel, under which the latter will run a CEGB-owned ICL 2970 at its Bracknell computer centre on behalf of the Board has been completed (CW, September 14). As expected the CEGB regional centres will use the 2970 for software conversion while Computel bases its VME/B bureau services on the machine.

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# High speed Z80A analyser launched

ANNOUNCED at Weston last week, the Z80A Microsystem Analyser of USA from Millennium Systems of Cupertino, California, is now available in the UK from Microsystems Services.

Though Z80 based, it can also be configured to test 8080 or 6800 based systems, with 8085 emulation to be added by the end of the year. Each additional emulator costs £887 and a "signature analysis" option for £569 allows checking of bit streams at individual nodes in a system.

The USA emulates the processor by plugging it into its socket in the system under test and it is claimed to appear to the system exactly as the processor chip, without any extra noise or delay, up to the full 4MHz clock rate of the Z80A.

Customer wiring diagnostics loaded in PROM into the USA

can set hardware breakpoints, allow single-stepping through programs, and alternate register, memory and I/O location contents to detect hardware or software faults.

This data can be displayed on the unit's 20 character, 16 segment alphanumeric display, or a fault message in English can be shown.

Light enough at 21 lbs to be used in the field, the USA is also intended as a laboratory aid or program test instrument.

The £2,574 system provides a high degree of emulation transparency for the Z80A micro. According to Larry Badaglin, vice president of technical development at Millennium, the chip has posed problems in emulation, mainly because of its high, 4MHz operating speed. For emulation to work, the system must see the analyser exactly as

it sees the CPU chip, Millennium reckon to have achieved that degree of transparency.

A multi-user development system for 8080A and 8085 based products produced by muPro, that has been sold by Microsystem Services for over a year, is now available on short-term hire for £100 a week. Also made in the US, the muPro 80-ED is floppy disc based and can be used with up to four terminals for program editing and debugging using the BSAL-80 assembly language. For hardware checking, it functions as a self contained in-circuit emulator, plugging into the processor socket and controlled from the 23 key front panel.

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## Value of home market confirmed

CONFIRMING the recent Computer Weekly survey of the personal computing market (CW, August 24), the new magazine Practical Computing predicts a "home" computer market in the UK of £7.5 million in 1979.

Practical Computing spoke to over 40 suppliers of personal computing equipment who estimated that there are already about 5,000 home computers in Britain, defining "home computer" as a system costing less than £1,250 and used typically by small businesses, hobbyists and educational establishments.

Of this market, it is estimated that about 4% are in use in educational applications, 25% in companies with a turnover less than £500,000 and 16% by home hobbyists.

In the Computer Weekly survey, the total current market was estimated at about £5.5 million rising to £37.5 million in 1980. Practical Computing said it believed the £7.5 million estimate in its survey veered on the side of the pessimistic estimates and believed the market could be even greater once large companies like IIT made a full impact on the market.

Practical Computing, which aims to cover the business, hobbyist and educational application of small systems, is available from bookshops throughout the country, price 50p. Further details can be obtained from Practical Computing, 2 Duncan Terrace, Islington, London N1 3JL (01-278 9517).

## Comart looks to new Horizons

THE Horizon Z80 based micro-computer from North Star of Berkeley, California, is being launched at the Personal Computer World Show this week by its UK distributor, Comart.

Selling in kit form for £995 or assembled for £1,285, it features an integral mini floppy disc drive and 16K of fast RAM in a 12 slot AMT mother board. Software supplied includes North Star Basic release 4 and Disc Operating System.

Comart has a promotion agreement with North Star, and is looking to develop a UK network of agents and dealers for the system.

IT is generally agreed that one of the most important aspects of Britain's response to the "micro revolution" is to gear industry to understand the potential range of applications of the devices.

As a stimulus to the education of non-technical management in appreciating the potential of the micro, the Department of Industry has instigated the MAPCON scheme which helps to pay the

Edited by Martin Banks

fees of consultants who are educating and advising companies on applications. Here, BRIAN BENSTER of Mektronik Consultants, of Astley, Manchester, one of the authorised MAPCON consultants, describes from personal experience in running courses for the non-specialist, the best way to run courses which explain the micro principles without becoming bogged down in jargon.

## Courses for newcomers

INFORMATION on micro-processors is abundant. Introductory articles for the newcomer (are there any newcomers left?) aim to explain the technology in simple terms. Seminars by manufacturers and universities serve to update engineers and computer personnel on new techniques, technical developments and newly-introduced devices. Such information is readily digested by the professional and also by the hobbyist. What qualified, self-respecting engineer or programmer hasn't taken some steps to further his knowledge of micro-processors?

If the opportunity doesn't arise at work — or cannot be made to do so — then self-education might be the result. Literature is sought and pored over and possibly some hardware is purchased.

Important as engineers and programmers are, it is senior

wants is something simple and geared to the implications, effects and results, that is, the effect not the cause. Any courses run specifically aimed at managing directors, senior managers and the people who sign the cheques to buy microprocessors or implement micro-based schemes should have clear-cut objectives.

A tremendous amount of effort must go into cutting the jargon down to half a dozen terms. The subject then must be considered from the managers' viewpoint — what microprocessors will mean to him, what it will cost and what will be involved.

The course should serve to explain the present day importance of micros and why they are causing such a revolution. The essential features of a micro-processor and what it is and does should be discussed in the simplest way possible, backed

audience so that the course can progress slowly and simply. Add it must encourage managers to ask the questions that have been at the back of their minds, but which they have been afraid to ask.

Add to this a variety of visual aids and demonstrations and you have an easy to understand introduction to microprocessor for the non-technical decision maker. The techniques to show are simplicity, only the most essential technical details are introduced and even these are kept to an elementary level.

In our experience, once someone pushes the buttons to make the lumps light, the interest really starts. If this theme is developed, the managers will want to continue the next day with their own equipment in their industry and, with their ideas.

Our experience from a considerable number of courses has



Brian Benster of Mektronik Consultants teaching the "micro revolution" to the uninitiated, under the Department of Industry's MAPCON scheme.

management which must make decisions on future policies, whether to delve into micro-processors or not and what line to take. Often the very enthusiasm of engineers is seen by managers as a disadvantage — is it a new toy or not? To the manager it doesn't even matter if it's CMOS or TTL.

There are not many managers, though, who can dismiss micro-processors as a disadvantage. The press is full of these devices, the Department of Industry is spending £70 millions on new projects by authorised consultants scheme (CW, September 14) and great store by the term Silicon Valley.

Microprocessors do present a problem, however, for non-technical managers. Software, hardware, handshaking, daisy chains, vectored interrupts and nibbles confuse up vision of a highly complex and involved subject. What the manager

led us to believe that the objectives can not be accomplished easily if such a seminar were conducted by a company's own personnel, even though this expertise has been available in many of the companies that we have visited.

To the professional and enthusiastic engineer or programmer who feels that his managers do not quite grasp the point of the micro revolution, or are being too slow to act, why not introduce the idea of a course? There are far more applications for microprocessors which are waiting to be discovered so far. One forecast is that only 10% of possible applications are known at present.

And if your manager responds "Our competitors aren't doing anything yet", ask him if he instructs his sales force to wait outside prospective customers' offices until he sees his competitors arriving.

## DP salaries lag behind average

SALARIES in data processing have risen less in the last year than the national average, according to figures in the new edition of the Computer Users' Year Book. DP salaries rose by 10.8% on average during the year ending May 1978, compared to a national increase of 12.5% over the same period.

The Year Book also points out that in the 10 years since it started publishing, computer usage in the UK has grown tenfold and hardware costs have fallen eight-fold. It arrives at these figures by noticing that the 1968 Year Book records 5,000 terminals with modems in use, whereas the figure today is 52,000.

The Year Book estimates that a small business system costing today around £20,000 is the equivalent of a 1969 machine costing £50,000. Allowing for a three-fold drop in the value of money, this would mean real hardware costs have gone down eight times. This has been offset partly by rising costs of software.

The salary figure for DP comes from a nationwide survey of 23,000 employees carried out by the Year Book, while the national figure is from the De-

partment of Employment. Looking at specific jobs in DP, only increases for senior programmers (13.13%) and senior operators (12.66%) were higher than the national average, while DP managers' pay went up by 10.45%.

Operators had the lowest increase, at 8.19%. Staff turnover was 14.9% on average, and overall growth in numbers of staff was 2.52%.

Looking at other changes over the last ten years, the Year Book notes that the number of installations it lists has gone up 171%, while the number of actual machines has increased 375%. The largest increase it gives is that in the number of consultants and software houses: 814%.

The tenth edition of the Computer Users' Year Book, now on sale, incorporates several new sections in addition to its traditional directories of suppliers and installations. These include a survey of computer networks, together with a prognosis on their development world-wide, an article on personal computing and a classified bibliography.

A unified index to the whole book has also been added to help readers find their way through

## Boom in services

THE latest Business Monitor statistics from the Department of Industry on computer services show that total business income increased by more than 20% between the first quarter of 1977 and the same period this year.

The first quarter 1978 figure was £75.7 million, of which £20.7 million came from billings to parent and associate companies and the rest from outside business. The latter accounted for most of the overall increase in business over the 12-month period.

The Business Monitor breaks

outside billings down into billings to public service clients, to other UK clients and to foreign clients. Public service business increased from £5.9 million to £9.8 million, other UK business increased substantially from £31.2 million to £40.8 million, while overseas billings amounted to £4.3 million in the first quarter of 1978 compared with £3.1 million the year before.

Consultancy business with foreign clients went up dramatically from £1 million to £1.7 million.

## US foothold for C and W

WHILE reporting a pre-tax profit of £36 million on a total revenue of £177 million, Cable and Wireless chairman, Lord Glenamara, announced the company's largest ever contract for £200 million. Covering a five-year period, the contract is for provision of a telecommunications network for Saudi Arabia and a training facility for the Saudi National Guard, which will operate and maintain it.

During the year Cable and Wireless bought three companies in the US, giving it a foothold in the telecommunications market there. "We value this market because it is the largest in the world, and is the major source of leading edge technology," said John Bird, managing director of the company's Communication Systems and Services Division.

"With Carterfone, Incotel and TDX Systems, we have established ourselves in the US and

this is reflected in the division's revenue increase from £18 million to £29 million."

CSS is to manufacture a computer-controlled telex exchange from Plantronics of Santa Cruz, California, for which it has marketing rights for 50 countries outside the US, including the Middle East and Africa.

The major part of the company's revenue comes from operating public telephone concessions in foreign countries. It does not expect this to go on growing, so increasing effort is being put into turnkey telecommunications systems, assembled to order from suitable products on the international market.

Three directors retired during the year, including Jim Hodgson who was the last of the series of board members from the Post Office. Two new directors were appointed: Patrick Meaney of Thomas Tilling and John Salkeld of accountants Binder Hamlyn.

## Siemens technical users

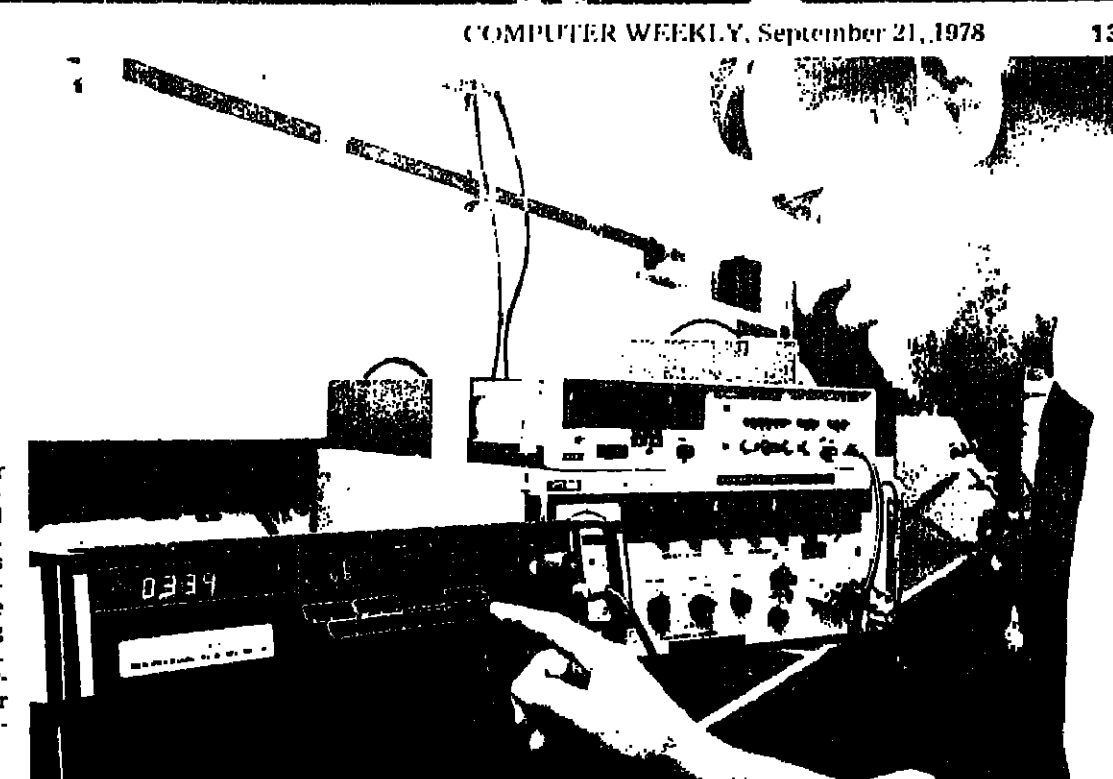
THE association of scientific and technical users of Siemens computer equipment, Wasco, is to hold its sixth conference on October 5 and 6 in Kiel, West Germany.

Wasco was founded in 1976 and since then has attracted more than 60 member installations. Working groups include those responsible for languages and program packages, the BS 2000 operating system, and computer centre management. More information from Mr

Notling, Universität Bielefeld, Rachenzentrum, 4800 Bielefeld, Germany.

## Floppy disc order

IN a report of an order placed by Research Machines, Oxford, for floppy disc drives from BASF (CW, September 14), the value was incorrectly stated and should have read £100,000. We apologise for any confusion caused.



Designed in the US by Recal-Dana, this Series 6000 microprocessor digital multimeter uses a 6802 microprocessor to calculate and record minimum, maximum and average values of voltage, current or resistance. Analysis is based on up to 9,999 readings taken at a pre-settable sampling rate. Prices start at £1,695.

As well as these imports from the US, Recal-Dana has sold £60,000 worth of British-made instruments to the US Navy in an order for 50 Model 500BN modulation meters plus spares and service. These meters have been available for several years, and are supplied in a programmeable version for the British Army's Clesman communications project, as well as to other European defence forces.

Another Recal-Dana instrument from the US, the Model 8814 counter-timer, also uses a 6802 microprocessor to make frequency, period, time interval and ratio measurements of communications signals up to 100 MHz, and average them. An option allows mea-

## 10a.m.



## 1p.m.



## 5p.m.



## 10p.m.



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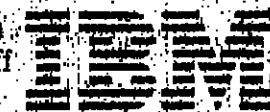
Operators will appreciate its simple JCL maintenance, its facility for automatic restart and its control of system usage, while to the end user it offers APL, BASIC and Fortran with a wide range of application packages for business management and project control.

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# The New York Times

## The Times... they are a-changin'

NEWSPAPERS are the oldest of the mass media, originating as they did in the printed sheets that in the sixteenth century circulated news of trading ventures around the financial centres of Europe.

They are also the most threatened, although they have survived surprisingly well through this century—albeit in greatly diminished numbers—despite the death knells that have been sounded for them at the introductions of radio, television, and now videotex.

Newspaper production has always been highly labour-intensive, and as sky-rocketing costs kill off large numbers of titles, those remaining are placing their hopes for survival on computers.

Arguments between management and unions in Fleet Street over "new technology" have been going on for years, and there is no end in sight.

Meanwhile, the most prestigious newspaper in the United States (if not the world, the New York Times, has switched over entirely to computer composition after many years of planning, deliberation, experiments, and negotiating with unions.

During this year's Independence Day holiday weekend, the last Linotype machine was closed down, to be replaced by computer-controlled photocomposers and banks of VDUs, operated by journalists themselves.

Computers linked to phototypesetters do not by themselves make enormous changes in the economics of newspaper printing; they provide greater flexibility and a variety of minor aids, such as sorting of advertisements and hyphenation of words at the ends of lines.

However, their great significance is that they make practical direct input of text by the writers themselves; thereby the compositors, who have always made up a large part of a paper's workforce, are eliminated altogether. The New York Times formerly had 900 compositors, proof-readers, and make-up-men, but will soon have only 350.

Traditionally reporters have produced their work on typewriters, and after marking up by sub-editors, the pieces of paper are carried by "copy boys" to the compositors who key the text over again on machines called linetypes. These



While Fleet Street newspapers vacillate over the introduction of "new technology," the grand old lady of the US Press, the New York Times, has completed the changeover to an entirely computer-driven printing system, with journalists taking over their keyboarding from skilled compositors. RORY JOHNSTON (pictured left) reports on this upheaval within the ancient craft of the Fourth Estate.

generate the type as solid slugs of lead alloy, one per line. Now, all the typewriters and linecasters have been thrown out and replaced by 250 VDUs on which the reporters type their stories.

A network of six Digital Equipment PDP 11/35s receives the stories and stores them on disc. Editors call the stories up on other VDUs, make any changes that are necessary, add instructions as to headlines, type style and size, and then the stories go to one of five Metrosat photocomposing machines.

These produce typeset text on photographic paper at the rate of 1,000 lines per minute. The characters are generated by software on the face of a CRT and projected by a lens on to the paper.

The shapes of the characters, in a whole range of different

typefaces, are held in digital form in memory, giving enormous flexibility. The strips of paper, after development, are cut up by hand and pasted-up on boards to make up the pages. "Cold composition" as it is called, is usually printed by offset lithography, in which the printing plate is a flat sheet of aluminium with a chemical coating carrying the image to be printed.

Indeed, the New York Times has a new satellite printing plant in New Jersey that will use this process. However, the paper already has a large investment tied up in its existing Manhattan plant in conventional letterpress equipment.

These presses use cast lead plates on which the image is held in relief. So that these machines can continue to be used, a process called Letterflex is employed to make plastic plates, still with the printing image in relief.

The pasted-up pages, including half-tone photographs, are scanned at 1,000 lines per inch by a laser facsimile system and sent four floors down the building where a "laser mask" like a photographic negative, is made.

Ultraviolet light is shone through this on to a steel sheet covered in semi-liquid plastic, hardening the plastic where it falls. The unhardened plastic is blown away with an air jet leaving a flexible printing plate that can be bent into cylindrical shape for the presses.

The facsimile process allows the pages to be sent by a private radio link to the New Jersey plant, which prints special sections for the Sunday edition and can also back up the Manhattan presses.

Classified ads use a separate system of four interdata 70 minis to process their text input can come from OCR, so the papers' 70 outside agencies can prepare ads themselves on typewriters for direct input.

This has the added advantage of reducing errors, as does the elimination of compositors on the editorial side.

The journalists' system is basically a Harris product, using their VDU and software, with

collaboration on the design from the Times' development staff.

Interestingly enough, there are some things which the new technology makes more difficult rather than easier. For instance, if a story is slightly too short to fill the space allocated, with hot metal it is easy to spread some of the lines further apart by inserting slivers of metal between the slugs. Cutting apart the lines on the photographic paper, and sticking them down again while trying to keep them straight and even, is a much trickier process.

The manual pasting-up of the pages may seem antiquated in the midst of all the surrounding advanced technology, but according to John Werner, the Times' director of R&D, no existing screen-based system would do the job to their satisfaction. One will come eventually, though, he is certain.

The printing unions did not agree to the changeover to new technology without a struggle. The contract for the current arrangement was signed in 1975, after many years of strife involving all the New York newspapers during which many titles, including the famous Herald Tribune, died.

The inexorable economics of the situation finally dawned on the unions, and they settled for an agreement providing sizeable financial inducements, staff reduction without sacking, but by attrition only, and retraining.

UK newspapers have hardly begun to introduce any of these changes, but there is little doubt they will have to do so eventually in order to survive. The most contentious issue is whether the journalists will protect printers' jobs by refusing to do direct

The NUJ has said it will, but in fact there is little love lost between journalists and printers (printers are paid considerably more on Fleet Street) and when it comes to the crunch things may look very different.

Mirror Group Newspapers has installed some computer-setting equipment, but as yet it is only being used on the weekly Revue. There was a good deal of labour trouble when Revue started to use it in February which has now been cleared up. When the Daily Mirror and Sunday Mirror will start to switch over is not yet known, but it could be later this year.

The hot metal technology that is being replaced at the New York Times has had a good run for its money. The Linotype machine was invented by Mergenthaler in the 1880s and it is a tribute to him that it has survived almost unchanged to this day. Sadly, many printers' skills are being lost along with the metal type.

The NYT quotes Arthur Genge, a make-up printer: "To me it's no challenge any more. Editors used to come up and work with you. Does this fit? Can we make this work? You had a sense of artistry. You

were a craftsman. Now you paste it on the board. There's nothing to it."

Genge carries in his wallet the card issued to his grandfather by the International Printers Union in 1897.

William Maloney, a supervisor of proof-press operations, said: "It's too simple. I used to call this—he pointed to the old composing room—"organised

confusion. But that's what makes the job. This thing"—he nodded toward the new composing room—"is quiet. It doesn't have the rhythm, the flavour. It's like working for an insurance company instead of a newspaper."

"We were proud of being printers," said Ned Ferrall, technical supervisor. "I'm proud. Now the computer does for you."



The new way: A journalist on the foreign news desk of the New York Times types in a story on one of 250 Harris 1740 VDUs.

## WEEKLY electron

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## Independents give Lomac a boost

THE top management reshuffle at Logical Machine Corp. of Sunnyvale, California (CW, September 14), is being well received by the many independent suppliers who are now the main outlets for the company's Adam small business system.

Lomac was set up in 1975 by John Peers, who was managing director of Allied Business Systems in the UK before going to the US, to produce and market Adam. Peers has now been superseded by Jerry Brandt in the day-to-day running of the company, and he is tightening up drastically on spending in an effort to get Lomac back on a profitable path.

Most of the Lomac sales force has left or been laid off and many of them have set up independent sales operations. One of these is Stan Bootle, another UK expatriate who was with Warwick University and Univac before moving to the US. He joined

Lomac in its early days but is now selling Adam through his own San Francisco company, Adam-Ant Inc.

Commenting on the Lomac changes, Bootle said that he thought the simplicity of Adam had been oversold and this had resulted in some confused first-time users. Now, however, with independents such as himself giving more effective backup, the claim that Adam could be "plugged in like a toaster" was proving true for many users.

Bootle said that the software packages for routine applications which Lomac had been offering, to get first-time users off the ground, had proved very useful; but the promises made over software by some Lomac salesmen had given the company "considerable problems", according to Brandt.

However, users had made good use of these packages and had also developed many of their own. Bootle says there is an

active user group in the San Francisco area which is typical of several in the US and there is an active exchange of operating know-how.

Some users who are running out of capacity have installed a second Adam system, and floppy I/O which is now available has eased integration with other systems. Worldwide about 500 Adams have been sold.

However, the introduction of Able, the larger system that can handle up to 16 terminals, is now awaited. The company says that this will be announced "sometime next year". The hardware is understood to be ready, but software is still under development.

At the other end of the line Tiny Adam, or Tina as it is now known, is due to start deliveries next month and is being made available through the Byte Shop network of the Lomac subsidiary, Byte Industries. These shops are switching from hobby sales to selling assembled systems.

## Interactive graphics system from Calcomp

A POWERFUL standalone interactive graphics system, the IGS 500, that can support up to four display stations and four digitisers has been introduced by Calcomp.

The IGS 500 is configured around a minicomputer with a main memory expandable to 256K bytes, and the software provided with the system includes a high-level language called Interactive Graphics Language. IGL enables the user to create his own application programs. Calcomp itself can supply applications packages for design and drafting and mapping management.

Each display workstation comes with separate alphanumeric and graphics displays, a digitiser tablet, a joystick picture controller and a local 64K bytes picture processor that can be used to manipulate a drawing

without affecting the other users of the IDG 500 system. Functions that can be performed locally include scale, zoom, blink, pan and rotate.

The basic IGS 500 system with one display workstation and a 50 Megabyte disc drive costs \$55,000, and can be expanded with disc storage up to 1,200 Megabytes and a variety of other peripherals including the Calcomp 980 plotter.

### Memory debut

THE bubble memory device expected for some time from Rockwell will be shown for the first time in Europe at the Electronics exhibition in Munich in November. The Rockwell device has a capacity of 266,500 bits and will compete with the 266K TIB 0303 announced by Texas Instruments last month.

## Micro revolution

### From front page

of information technology (CW, March 2).

The ACARD working party asks the Schools Council to examine how semiconductor technology will affect school curricula; the departments of education and employment and the Manpower Services Commission to develop appropriate courses to ensure that within five years shortage of appropriate trained staff is not a constraint on exploiting semiconductor technology; and the Department of Industry to co-ordinate efforts, costs about £5 million a year aimed at adult education and training in semiconductor applications.

The government broadly accepts these recommendations and says the departments concerned are "drawing up plans for early implementation."

ACARD also suggested that the Neddy working parties should make a systematic assessment of the impact of semiconductors in their industries.

On most of the other main ACARD recommendations, such as increased government aid to the micro-electronics industry and micro applications, the Department of Industry has already acted.

The call for a Royal Commission came from David Barnett, general secretary of the General and Municipal Workers' Union.

## Security bulletin

STARTING IN November, a monthly bulletin entitled Computer Fraud and Security will be published by Elsevier International. This will cost £56 per year and will aim to inform management on the nature of computer fraud and techniques that can be used to combat it.

Head of the editorial advisory board will be Michael Comer, who is an experienced advisor on security to government and private companies.

In addition to reporting on current cases of computer crime, the bulletin will look at problems of auditing and accounting, personnel and legislation. There will also be a page for readers' letters and a "problem corner".

## Japan to invest £70m in OS

THE Japanese government is to invest about £70 million over five years in developing operating systems to challenge whatever IBM may offer on its forthcoming E and H series.

This has been revealed by the Japanese Ministry of International Trade and Industry as part of its next five-year plan for the Japanese computer industry. This plan also includes offering tax incentives to help promote the development of unbundled software package sales (CW, September 14) and a five year investment plan of about £20 million for the peripherals and terminals industries.

The participating companies, which include Hitachi, Fujitsu, Mitsubishi Electric, Toshiba and Nippon Electric, will be expected to match the government investment, bringing the total programme for five years to about £180 million on software, peripherals and terminals.

In addition to the operating systems and Japanese high-level languages, the plan also stresses developments in distributed processing and memory techniques.



The Dataproducts printer ribbon manufacturing plant in Pinglas, Dublin (pictured above) is likely to exceed the expected production of 60,000 ribbons in its first full year.

### WP workshop

WORKSHOPS on word processing for managers and supervisors are being organised by ICFC Training under the direction of Keith Wharton. Both workshops are being given twice: October 17-18 and November 27-28, at the Café Royal, London. ICFC Training is on 01-940 6650.

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43 KBR (30 CPS)	65	50	45
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1205 cassette/coupler	200	170	130
1204 cassette/hardwired	180	152	115
1203 KSR/coupler	100	85	67
1202 KSR/hardwired	90	75	57
1132 KSR/coupler/132 column	120	102	78

Option: APL/ASCII switchable £10.00 per month

### PAPER TAPE READER/PUNCH

LPR 300 (30 CPS)	65	53	45
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### GE TERMINET (30 CPS)

30 KBR 80 column	50	40	35
30 KSR 80 column	85	75	65

Options: 132 column £3.00 per month, others on request

### V.D.U.

7000 (80 x 24)	60	45	35
7009 (80 x 24)	85	70	60
311 (64 x 16)	50	35	34

### 5 LEVEL TELEX TYPE TELEPRINTERS

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Siemens T100 KSR	75	60	50
Teletype 32 ASR	65	45	45
Teletype 32 KSR	55	35	35
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# Qume venture which became an empire

FOLLOWING generous exposure on BBC-TV's Risk Business programme this summer, the Qume success story is one of the best known in the computer industry.

Viewers learned how David Lee, designer of the Diablo daisy-wheel printer, saw his vital role go unrecognised when Xerox acquired Diablo; how he left to become the kingpin in a new company supported by venture capitalists, and was persuaded, rather against his inclinations, that the brand new product he should design was — a daisy-wheel printer.

The new company duly went into the daisy-wheel printer business, and the burgeoning word processing market took it from a tiny company in 1975 to a \$54 million empire in the last

financial year, which closed in April. The company expects to more than double turnover this year, and with forecasts that the word-processing market will continue to grow at an annual 30-40 per cent per annum, and shared logic systems growing at nearer 60 per cent, any slowdown in its main source of revenue looks a long way off.

Qume's success, of course, grew out of the fact that the only other source of daisy-wheel printers has been Diablo — and that company's parent is Xerox, itself a major competitor in the word processing business. Companies entering the business were disinclined to make a competitor a major supplier, and so Qume's reference list, including such names as Burroughs Redaction, AES-Wordplex, Vydec,

Lextron, Phillips-Mycom, not to mention IBM — reads like a Who's Who of the business.

The most significant names outside the Qume camp are Xerox itself, and Wang, which uses the Diablo printer, and has now developed its own Xerographic printer for use with word processors (CW, August 24).

To meet demand for its printers, Qume doubled both the rates of production and the number of people employed over the past year, and plans to double sales again this year, although the rate of expansion of the workforce will begin to slow down. The company employs between 1,500 and 2,000 people and has formed Qume Caribe Inc. in Puerto Rico to manufacture printwheels and

ribbons to supplement output from headquarters in Hayward, California.

Demand for Qume's products is still so great that deliveries are typically made 90 to 120 days after receipt of order, though this closer to 60-90 days. The new Sprint 5 daisy-wheel printing terminal is being built for stock and will be available on 30 days' delivery.

Qume is well aware of the potential risks involved in being a one product company and is investing over five per cent of its sales revenue in research and development.

Significant advances have been made in product design, notably the adoption of microelectronics, which makes maintenance much simpler. Boards can now be replaced without need for adjustment, where previously potentiometer circuits needed to be tuned in order to balance the servos each time a circuit board was exchanged.

Microelectronics allows more control of ribbon advance and hammer intensity and reduces the cost and complexity of the products.

Paper handling has been improved, new types of ribbon have been developed, and the variety of printwheels developed has grown steadily.

But Qume sees comparatively little further scope for major reductions in the cost of the product, and although it is constantly on the watch for new technologies which might offer comparable print quality to the daisy-wheel at a lower cost, there is nothing in sight. The

## Tim Palmer visits the blossoming world of the daisy-wheel printer



company acknowledges that it would face problems if anybody could refine matrix printer technology to produce daisy-wheel quality, but again, there are no signs that this will happen.

The Sprint 5 printer terminal does mark a mild departure for Qume, and further extensions of the technology are planned. The company is also likely to move into more loosely related electromechanical areas; it does not, however, plan to enter the word processor business on its own account, believing that it would be unwise to go into competition with its major customers.

The similarity of the Qume name to two Exxon office equipment companies Qyx and Qwip, and the fact that Exxon has a stake in Qume, has led people to suppose that the company is part of Exxon's globe strategy. In fact, however, Exxon's stake in Qume is less than 10 per cent and the oil giant has no say in the running of the company.

One of the questions often asked about Qume is where it got its name. Apparently the founders commissioned a list of meaningless monosyllabic words, and Qume was the one selected.

## Facit saga of Sweden

THE Swedish data processing industry is synonymous in most people's minds with Datasab but there is a second Swedish company operating throughout Europe and much of the rest of the world, selling a competitive portfolio of peripheral products, mainly to the OEM system builder.

That company is Facit, now part of the giant Electrolux company. Facit has been in data products since 1956; the systems side of its business was transferred to Datasab following the acquisition of Addo, a paper tape equipment specialist, in 1973.

The data products division of Facit represents about 50 per cent of the company's business, and is supported by a factory employing some 700 people at Atvidaberg, 150 miles south-east of Stockholm. Facit's own products comprise a range of paper tape peripherals which still bring in big business, particularly in numerical control, and an expanding line of printers.

Seeking to expand its product offerings, Facit achieved something of a coup in October 1975 when it acquired the exclusive European distributorship for everything produced by daisy-wheel printer specialist Qume Corp, the company which has grown big on the back of the word processing boom.

Facit believes that it offers US companies — an attractive European partner, because it has subsidiaries in all the major European countries. As Alan James, who heads the data pro-

ducts division in the UK says: "Americans see Europe as a single market."

Facit also markets a 180 chip matrix printer from Datarol and has taken a 36 per cent stake in the company with an option to expand it to 50 per cent.

Preparing for the day when paper tape finally dies, Facit is now moving into the cassette and cartridge tape market, and has discovered another new US company which is in the same infant stage now that Qume was in three years ago.

The company is DEI of Pasadena, founded by ex-IBM and Hewlett employees with the aim of producing a tape cartridge which would improve the performance of the 3M cartridge.

DEI has achieved its aim, and now has a cartridge capable of carrying 11.5 Megabytes of data — fully adequate for doing a dump from a 10 Megabyte fixed disc. The cartridge is used for this purpose in the new Basic 4 System 400 business computer, and has also been adopted by NCR, while a rugged version is being used by Philips in Sweden for military applications.

Facit plans to launch the cartridge unit in the UK at the Compec exhibition in November.

In the UK, Facit's business is still dominated by paper tape products, which represent over 50 per cent of the annual turnover of over £4 million, but the Qume products represent a growing proportion of the total.

## DISTRIBUTED PROCESSING

# Why full potential could be delayed by standards

By Pat Blunden

IN their enthusiasm to take advantage of the new techniques offered by distributed processing, how many computer users have actually paused to consider what precisely the term means?

For there is a real danger that in their eagerness to embrace the new concept, some users do not stop to consider whether what they are doing is really a new form of computing.

Consider the following examples. A distributor uses terminals, in his warehouses around the country, linked into a central computer to keep track of order levels and stock holdings. Is that distributed processing?

A manufacturer with regional offices in different parts of the country has a small business computer at each to handle its own invoicing. Aggregated summaries are then sent to head office for accounting purposes. Is that distributed processing?

Both examples use computers or terminal equipment in different geographical locations and both have seen the wisdom of not centralising their processing far away from the place where the work is actually carried out.

But I suggest that neither is a real distributed processing system. If we accept the criteria which I will describe, for I believe that geographical spread by itself, or the use of computing equipment in different locations, does not create a true distributed processing system.

Both of the systems I have described are typical of the kinds of business computing arrangements which have been in existence for years.

So why now label them distributed processing? If the term is to be meaningful, it should refer to a form of computing which is new and offers previously unrealised possibilities.

What I am saying is that if we are to make progress in developing distributed processing systems we have to have a commonly acceptable definition of what they are.

So where do we start? Any data processing activity has to take place somewhere — and there are many technical, economic, organisational and management arguments which can lead to a choice of the most appropriate physical locations and class of computing system to support a particular function.

The allocation of functions to systems and locations has always gone on in data processing. It would be useful if a term such as distributed processing could be agreed to describe new and recognisable techniques and capabilities within data processing.

I suggest that these capabilities are concerned with the

connection and co-operation of independent data processing functions within a combined activity.

**'A small computer system might have the capacity to run programs but not store large files. If it could access files on a larger system automatically, that would be distributed processing.'**

To take this definition further, there are, I believe, two main requirements for a true distributed processing system. First, processing should take place on more than one computer system. Secondly, the systems should work together automatically, rather than in a way which does not involve computer techniques.

This might involve any of a number of different activities in practice. For instance, one computer might automatically supply data to another. One computer might automatically carry out a task on behalf of another.

A small computer system might have the capacity to run programs but not store large files. If it could access files on a larger system automatically, that would be distributed processing.

A more complex example would be one computer running a sub-routine of its own on a different computer automatically.

It is a mistake to believe that distributed processing networks always involve the use of a large host computer with small computers attached to it. It can use computers of approximately equal size, for one of the potential benefits of a distributed processing system is that the separate systems within it can specialise.

For instance, one might handle multi-user interactive work, while another would be used for large database access. In another example, one might handle fast mathematical programs, like those common in linear programming, whereas the other might be used for the human interface into the system.

What is clear is that this method of computing could be more efficient than the past practice of having a huge computer with a giant, monolithic operating system which pre-empted much of the computer core resources.

But there are, in fact, a number of pressures which lead users to opt for separate, independent computing systems. It follows that advantages will

eventually flow from linking the systems in distributed networks.

Some of the factors influencing the switch to independent systems include:

● The spread of operational applications supporting the direct activities of many groups in companies and organisations, which leads to managerial demands for local control of functions and resources, and technical demands for customised and separate functions.

● The complexity, performance efficiencies and limitations of multi-purpose, multi-function computer systems and their operating software. This leads to technical and economic demands to limit the scope and functions of any one computer system.

● Data, locations and data transmission costs lead to demands for separate geographical location of systems and functions which reinforce the managerial control and technical complexity arguments.

If these trends do lead to computing functions taking place in a number and variety of systems, possibly in different locations, there could well then be a demand for automatic system inter-working because the different system functions may be inter-related, as stages in an overall process or in a service co-ordinating role.

If the co-operation and inter-working of these distributed functions is an automatic process then the combined activity represents distributed processing.

If the separate systems and programs interface via manually supervised scheduling, co-ordination, control or data transport, then a number of functions may have been separately automated but data processing techniques are not supporting the overall activity, and thus I do not believe that system could accurately be termed distributed processing.

In a sense, the situation is analogous to other quantum leaps in computer capabilities in past years. The introduction of job control languages in the early 1960s opened new possibilities for scheduling computer work. Similarly, the advent of remote job entry with data transmission represented another leap.

If distributed processing is to mean anything it, too, should represent a major leap in technical capabilities. And it does, in fact, require significant new technical abilities.

Among the capabilities needed to support such a system are system/software support for data communications, communication sessions, system inter-communication and program-program inter-

communication. The system will need to provide for data commands and control according to agreed protocol and procedures.

In the present state of the art, considerable progress still has to be made in establishing the protocols and their support which will be needed for advanced distributed processing systems. At a low level — for data communications — there are many available which are more or less suitable.

But at a higher level, for such tasks as process-process interaction, there are not many protocols defined and even fewer implemented, although IBM and Digital Equipment, in particular, have made some progress in this area.

If the true potential of distributed processing is to be realised, then users must have a choice of individual computers from any supplier for the component functions of a system, and these computers should all be able to communicate, which requires a consensus on standard protocols.

Definition of these for open system connection is still at a very early stage. At the moment the ISO (in conjunction with ANSI, the BSI and others) are working on a model for levels of protocols and their roles, and individual protocol proposals.

This work extends as low as communication link control and as high as data coding. But further progress on international agreement of standard definition in any of these protocol levels probably will not be visible for at least two years. An extensive standard and implementation are still further off.

**'If the true potential of distributed processing is to be realised, then users must have a choice of individual computers from any supplier for the component functions of a system and these computers should all be able to communicate, which requires a consensus on standard protocols.'**

In the meantime, there will be extensive development of "de facto" standards and manufacturers' standards and implementations. But his may restrict much distributed processing to closed systems of a single manufacturer.

The important question is whether this will delay users' ability to grasp the full potential of distributed processing.

THE bad old batch days are gone. In one form or another, distributed processing systems are the current rage.

But one of the problems with the term "distributed processing" is that vendors of computer systems can use it to mean all things to all users.

In this first article in this supplement, Pat Blunden, principal consultant with Scicon Computer Services, tries to dispel some of the myths surrounding the subject and looks at different systems that could be described as distributed processing.

Other articles in this supplement include one by Dennis Papworth, sales manager for Gamma Associates, describing what users should want from a distributed system, and one by David Matthews, on involving the user.

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CW 2/78



# Ask the users at an early stage

THE concept of distributed data processing can hardly be called new; for a number of years now it has been evolving throughout the computer industry.

But what perhaps is new is the extent to which distributed data processing can now be developed beyond the realm of mere concept into the sphere of practical working systems.

Distributed data processing means different things to different people. Much has been written about it in recent years

and there has been much debate about the trend to this type of computing.

With a world-wide announcement last year, Honeywell took its distributed processing ideas a long way beyond pure concept, introducing a wide range of new equipment to give what it has called its DSE (distributed systems environment) philosophy the means of expression in practical system terms.

More recently, the Honeywell Level 80/DPS, distributed pro-

cessing system, range of computers was announced which encapsulates, at the central site, the further idea of distributing the processing power needed within the mainframe.

But never mind the supplier for the moment (although there's a big question to address in that direction later) let us look at distributed processing from the user's standpoint. Because any technique that doesn't start there will almost certainly start off on the wrong foot.

The technical limitations that previously forced users to place all their computer resources at a central site — and to adjust their business operations to meet the restrictions imposed by such centralisation — have for some time been giving way to a more flexible approach.

This is: allowing the user to distribute the power of the computer in ways that best suit the needs of his business with as much, or as little centralisation as required.

What the user wants, and is now increasingly able to get, is the facility to locate processing power close to where the work is actually done while at the same time maintaining processing disciplines and central control.

Placing the computational activity closer to the actual work site gives faster response time and lower communications costs, and reliability is improved since a single malfunction does not bring down an entire system.

These days this is all well understood by users, and computer companies are well advised to listen to what they have to say about the systems they want.

Many firms have invested heavily over the years in centralisation — centralisation of computer hardware, operations, programming staff, and system software and applications development.

Now, while many users are saying that they want to distribute certain facets of their data processing away from the central site, they are also saying that they need increased capability at their central sites to meet the demand for growth and to maintain control.

For example, some want to distribute limited processing

Honeywell's DST 8/800 distributed systems terminal (above) is a miniature computer-based system providing for local processing, forms data entry, single pass forms output, table look-up, data validation and editing, user programmable data entry validation and file transmission to and from a host computer system. Up to four video terminals can be used with each system.

distribution of hardware and software to an end-user organisation in the way that best serves the objectives of that organisation.

What this adds up to is that there are clear trends and needs in the marketplace — trends and needs not totally favouring either centralisation or decentralisation across the market, spectrum but embracing an element of both in differing proportions.

That is to say, what users want above all is flexibility. They want the benefits of centralisation — large system price/performance, sophisticated operating system, improved security as well as multi-dimensional capabilities like transaction processing, time sharing and remote batch.

They also want the benefits of decentralisation such as dedicated processing power, files, application programs, and computer operations and, through the use of intelligent terminals, small business systems and microcomputers.

A good case in point is the computing network which Allied Bakeries is implementing to give its 50 bakeries throughout the UK a greatly improved service and more decentralised control over their own operations.

The network will be based on a tandem Level 86 large-scale system and 44 Level 8 minis. It will provide flexibility in the hands of local management, while retaining centrally the capacity necessary for the bulk processing associated with day-to-day production, sales and distribution of bread and bakery products across the country.

It is predominantly the time-critical nature of the baking industry that led Allied Bakeries towards this kind of distributed system which will be able to match production accurately and more quickly to sales requirements, and give local bakeries the means for determining — and giving effect to — their own order of priorities.

In the past, state of the art limitations and varying standards and interface protocols made the implementation of many such systems as this quite unrealistic.

There is undoubtedly, now, a continuing need for improved processor cost/performance; for improved communications; for a set of common protocols to ensure better standardisation and compatibility; for a more powerful set of terminals to allow the user more convenient system interface; and for enhanced technology to set the stage for future architectures.

Not only do these needs demand the right equipment but they also call for an overall approach to distributed processing.

At other times it calls for the

# Chance to show 'Beast' is friendly

By Dennis Papworth

DISTRIBUTED processing is computing of, for and by the people. It contains all the advantages of dispelling the mystique of computers but all the dangers of putting highly specialised equipment among non-specialist staff.

The mystique grew up in the sixties and early seventies when an enormous metallic beast was heaved by crane through one of the head office windows on to a floor that nobody afterwards ever went near, partly because they had No Business there and partly because it was inhabited by a breed of people who Spoke A Different Language. The beast was unapproachable, made life more difficult and was therefore resented.

Resented particularly by non-computer management throughout the company, whose departments were being disciplined from outside by the computer.

Now distributed processing gives the computer manager the opportunity to demonstrate that the beast is friendly: each department can hold a paw — or, to be more precise, a remote job entry terminal — without getting bitten.

All of which is good public relations as long as it works properly — as long as the non-skilled user can handle his terminal without difficulty and obtain his results effectively.

Not only must the system be easy to use, it must be seen to be easy to use. So, the format and sequence of commands to be used should be natural, easy to learn and easy to remember.

The number of commands is also important. Too many of them produce the reaction: "I can't understand it," which is a disguise for: "I can't be bothered to understand it."

This is a crucial point to be made in the promoting of a distributed processing system but it is a factor which distribution itself can make more complex.

The variety of different types of equipment involved will each have to be dealt with in different ways but it is vital that the user is not aware of this, that the software hides it from him and presents him with a homogeneous command format.

The user needs to be assured that the system he is using is reliable. This harks back to the topic of measurement. The user must be given a good impressive figure for mean time between

failures. An obvious carp at the reliability of a distributed system is that the multiplicity of equipment must make it more prone to failure than a simple central computer.

But once again the multiplicity can be used to advantage — failures can be accommodated by re-routing jobs past the critical point — so the advantage should be pointed out.

There is no reason why an intelligent terminal should be any less reliable than a non-intelligent variety. Its intelligence is based on semiconductors which have a proven record of reliability as computer components.

The service the user needs must be readily available. It's not going to get clogged up and his staff aren't going to be sitting for hours in front of a VDU waiting for answers.

Availability will obviously be improved by an addition to the number of host processors but for simplicity's sake the user should, if possible, be switched between the hosts automatically.

The service must be expandable to fit user needs and able to be expanded easily without disrupting the user's usage of it. Remember that ease of upgrading is measurable from the user point of view; it can be set out in terms of the number and type of new procedures the user has to learn to perform a new function. If hardware can be added in a modular fashion, that should please him too.

This modularity is much more achievable in a distributed computing system than it is in a centralised one, always given that the interfaces and protocols used between different pieces of equipment are standardised.

A centralised computer system tends to be monolithic, if only because it all comes from the same manufacturer or from plug compatible alternatives (which is pretty much the same thing). The variety of equipment in a distributed processing system must make it modular in design.

The user must see that the equipment he uses can be maintained with minimum disruption to his routine. Automatic self-diagnostic hardware and software and the use of network diagnostics through a network are the best way to ensure that problems are

isolated and identified quickly. The big problem here is that the processing power in your system is going to be widely dispersed, speaking in pure geographical terms, there's no way around this except for a rigid maintenance schedule.

The user will be worried that the information he processes via the system will remain confidential. Apart from the question of company security, there is also the problem of each department maintaining the degree of autonomy to which it is used.

Once again, geographical dispersion exacerbates the problem.

lem. The user may not even know where his data is being stored, so he is going to take a lot of reassuring.

There are various techniques available for personal identification to limit access to authorised users — having intelligence present in the terminal means that these procedures can be made quite difficult to simulate or circumvent.

Encryption of data while it is being sent through the network should be a flawless security device. But because the user has sophisticated equipment to hand in his own department, he should be able to store locally

and thus obviate the need to transmit large volumes of data at frequent intervals.

Finally, the design of the system must be oriented towards non-technical users. At the conference on future systems last year, an independent consultant laid down four basic design rules for anyone thinking about installing a distributed processing system in their organisation: the rules stressed that distributed processing is for ordinary

Distributed processing is one way that the traditional animosity between user and DP manager can be broken down. Yes, the user can even shake paws (remote job entry terminal) with the beast without getting bitten. Dennis Papworth, sales manager for Gamma Associates, describes what users should want from a distributed system. He concludes by urging that designers should orientate the systems towards non-technical users.

people. According to him, local processing power must not mean local specialist data processing staff and all technical implementation must be performed or controlled by the central computer department.

Also, data capture must be as near to the origin of data as possible and specialist data processing staff should not intervene in the internal distribution of data.

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conducted at a previous Nigel Laurie workshop on this subject was published in Computer Weekly on May 25.

For this latest workshop the number of participants will be limited in order that the maximum benefit may be achieved. If you would like to reserve a place please complete the application form and return it to the address shown, not to Computer Weekly or the IDPM. A brochure giving further information about the workshop may be had from Tony Swain, BIT, 40 Bowling Green Lane, London EC1ONE. Tel: 01-837 3638

Some see the key to distributed processing as an evolving one. And that means playing a responsive role when the users say where they want to go and the supplier then helps them to get there. DAVID MATTHEWS, director of marketing operations (large systems) at Honeywell, discusses a case study and the practicalities of effective on-the-spot DP. He sums up by urging all suppliers to consult the users at an early stage when putting theory into practice.

power and operations such as data entry to remote factories and distribution centres.

Others prefer even more distribution of processing power and applications using remote satellite computers; but they still want to maintain central control over programming and operations.

Again, some companies want to embark upon a completely new course, namely, total decentralisation with dedicated computers for dedicated applications.

The shift to remote locations extends right through to the end-user department, involving not only routine operations such as data entry, but also complete access to the computer facilities, including more sophisticated programming.

Users now expect computer power to be available at all levels and functions within their organisation.

This may manifest itself in the need for greater central system power and software capability, such as interactive languages, working from large central databases.

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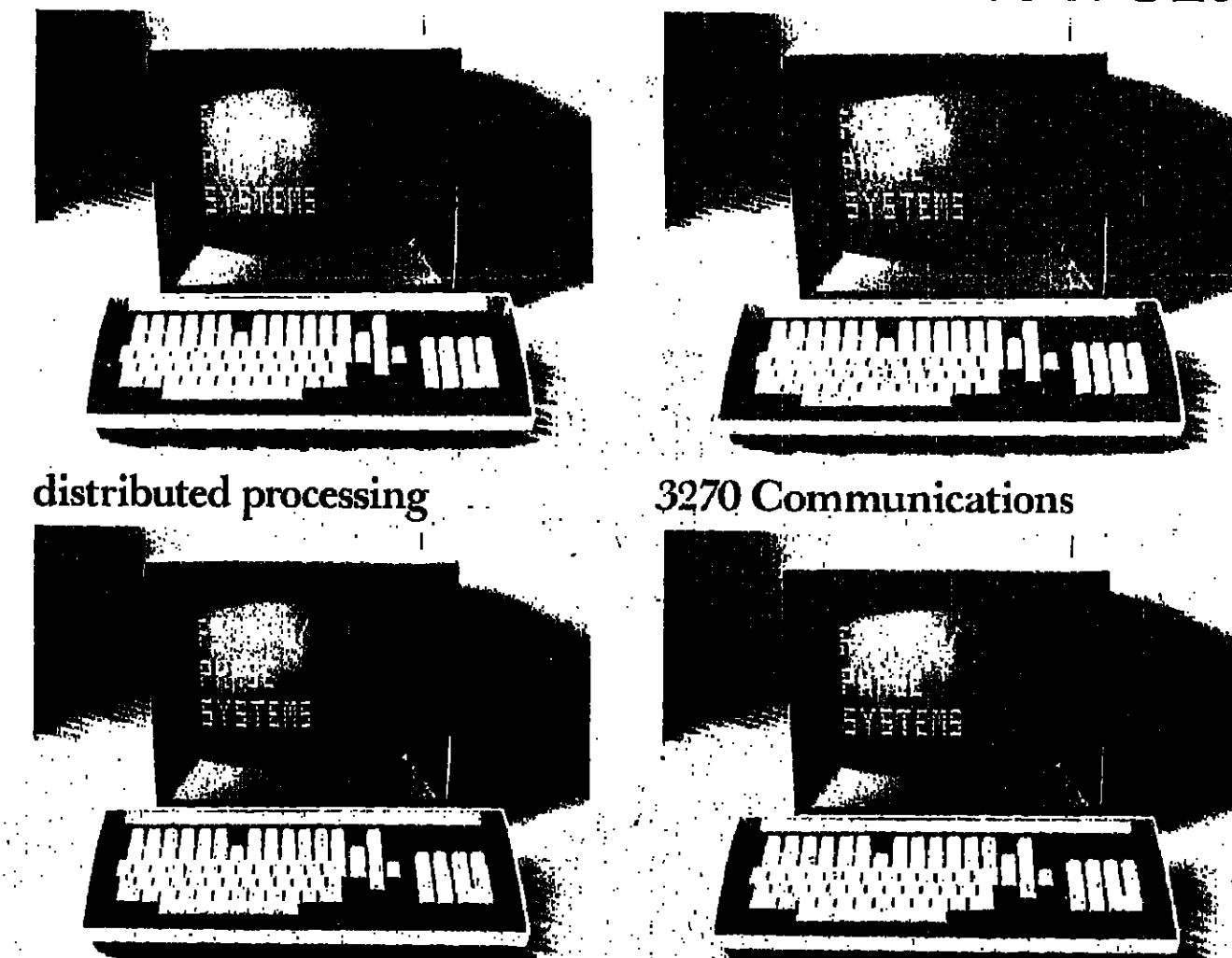
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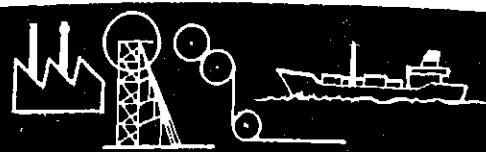
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## NORTHERN APPOINTMENTS



# Pilgrim's progress up the Motorway

By Peregrine Butler

If you ask a Southerner where Manchester is, you're likely to get this reply: "Manchester! Yes, well, it's a jolly long way up the M1." And there the conversation will terminate.

This applies to the North in general. Everyone has a vague notion of its whereabouts but no one is sufficiently well-informed to give you more accurate directions.

Southerners have all heard of Wales because they have friends who own weekend retreats there, but the North is in some dismal abyss beyond — never to be visited, rather like something out of Pilgrim's Progress.

I myself suffered from this misconception until I moved to the North. Naturally London friends were

horrified when I broke the news. To them the North was synonymous with Siberia. They were even more horrified when I reported that the North actually was a nice place — not everyone wore cloth caps, and they really did eat off tables with knives and forks. Some Northerners do wear cloth caps, but then Harrods sells the very same article for the winter fashions.

It's a pity that Southerners are so sceptical. In my experience, the North has more to offer than the South, something you will be made well aware of as you read this article.

To start with, there are the people — warm and friendly with always five minutes to spare. Not because they have nothing

better to do, but you might say it's just a natural courtesy to chat, and find out a little more about one's fellow man (a habit which, I have noticed, the people in the South certainly do not possess).

The North is liberally sprinkled with excellent shopping centres in beautiful historic towns and cities such as Chester, Harrogate and York. Of course, getting to any of these places is no problem whatsoever, as the North has the best motorway network in the United Kingdom, linking every city, airport and major town.

As far as the social side of life in the North is concerned, it is conveniently situated for all types of activities. If you're a fresh-air type

there are excellent outdoor pursuits. The North has superb walks in Derbyshire, the Yorkshire Dales and the Pennines. The Ribble, Dee, and Test are teeming with fish but not overcrowded with enthusiastic anglers.

For the theatre-goer, Manchester boasts several theatres with a very varied selection of entertainment, and of course the world-famous Halle orchestra is based in Manchester.

The Northerners take their social life very seriously, so we find scattered throughout the North some of the best night-clubs in the United Kingdom.

For the gourmets too, there are superb restaurants, admittedly not as concentrated as in the South, but certainly worth the journey. (Two recent

winners of the Egon Ronay Best Restaurant of the Year Award survive in Keighley and Ilkley in Yorkshire.) For those who enjoy a well-brewed pint, there are many delightful and picturesque pubs to be visited, with real ale at only 27p per pint.

The North is certainly not for the weight watchers! For the businessman, Manchester, as the commercial centre for the North, has every facility to be wished for, including fast train links with London (approximately 2 1/2 hours), and regular flights connecting with every other major city in the United Kingdom, and with Europe.

For the computer professional in the North, there is everything and more. It is possible to divide the ad-

The North to a Southerner is in some dismal abyss beyond — never to be visited, rather like something out of Pilgrim's Progress. I, myself, suffered from this misconception, writes Peregrine Butler, manager (North) of Knight Programming Support, based in Manchester. They were even more horrified when he reported that the North actually was a nice place. Some Northerners do wear cloth caps, but then Harrods sells them as high fashion in the South.

vantages of living and working in the North into three categories — domestic, social (which we have already covered), and career opportunities.

First of all, I'll take the domestic side for either a single or a married person. The main thing that springs to mind is property. It is possible to buy a terrace house in a beautiful village for as little as £3,000. Or the budding DP manager can buy a detached house in its own grounds for around £23,000. There are no problems or waiting lists for people who want to buy property in the North. (Just think, your house in the South could buy you something of around twice the size in the North!)

As a lot of these installations are new they carry most up-to-date and sophisticated hardware and software, therefore it must be obvious that career potential is enormous.

In recruiting for Northern clients, we find that most companies offer very generous relocation ex-

penses from the South. Salaries tend to be very competitive; in some cases more than you would expect to earn in the South of England.

All the larger companies, and the majority of smaller companies, rely on service organisations such as our own for both contract and permanent staff requirements. We are very much used as a consultancy, and that there is a more varied selection of work. This really means that the computer professional can select the job that suits him best, rather than accept the job that he may have to take in the South.

Still, anybody who reads the computer press regularly will know that there are a vast number of openings in the North of England, and that the range of career opportunities are too numerous to mention in this article. Let me just remind you that the more relaxed pace of life in the North lends itself to a more satisfying working environment.

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You will be 21+ with a minimum of two years' experience of IBM equipment. Ideally, you will have programming experience and a broad based commercial background. Whilst an experienced systems analyst is preferred someone with relevant programming experience would be considered.  
A salary negotiable up to £5500 plus 4 weeks' annual holiday and a staff discount scheme combine to make this a very attractive package, which also includes relocation expenses if appropriate. CW 2978

#### MANCHESTER

**TRAINEE OR JUNIOR SYSTEMS ANALYST** Salary c. £4500  
An opportunity has arisen within a progressive D.P. organisation for a Trainee or Junior Analyst. The qualities that our client is looking for is a self-motivated person with essentially a programming background. Systems Analysis experience, whilst being useful, is not essential as full training is offered. Therefore this could represent an exceptional opportunity for programmers who wish to further their career into Systems Analysis.  
In return, the company offers a realistic career path stimulating projects and scope to progress into on-line applications. Ref. CW 5978

#### MANCHESTER

**New ICL 2903 Installation**  
1 Analyst/Programmer, 1 Programmer, 1 Operator  
Our client currently uses bureau facilities and now plan to bring the D.P. function in-house based on an ICL 2903.  
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The Company offers excellent prospects for personal progression and is situated in a brand new purpose built office block. Assistance will be given with relocation where necessary. CW 2978

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Opportunities exist on development work with both main and miniframes. Specific expertise is less important than a high degree of competence and conscientiousness, as the Client has a committed policy of ongoing staff training.  
The company offers excellent opportunities for career development based on personal performance, and there are occasional opportunities for travel. Ref. CW 6978

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MERSEYSIDE REF: LL 78111

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**ANALYSTS & PROGRAMMERS FROM £4,000**  
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There is a chance to get away from the cities and work in rural Lakeland with our client who is engaged in advanced engineering. The requirement is for commercial and scientific analysts and programmers. The hardware is IBM 370 under DOS/VS. Languages include COBOL, Assembler, FORTRAN, ALGOL. Flextime is in operation. Relocation expenses where necessary.

**OPERATORS TO £3,250+ SHIFT ALLOWANCE**  
LIVERPOOL REF: LL 78102

Our client operates a computer department which in itself is larger than many medium-sized companies. The current vacancy for experienced operators therefore offers real challenge and opportunity. If you would like to work in a large installation, have operated mainframes for two or more years and would be prepared to relocate if necessary, this could be your big chance.

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**SENIOR PROGRAMMERS £4,000 — £5,000**  
LIVERPOOL REF: LL 78107

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If you are interested in this vacancy, please write for an application form (quoting job reference number) to Mr B. Sutherland, Personnel/Training Officer.

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For information and an application form, ring Kate Hudson on Alderley Edge 582828 or write to her at:

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Our Clients are Humberside's largest and most successful computer bureau providing services to both Clients and Group users. They are currently developing a wide range of package and bespoke systems utilising both ICL mainframes and Digico mini computer hardware.

## ANALYST/PROGRAMMERS to £5,500

These positions will involve designing and specifying commercial systems and packages, with involvement in mini computers for data collection and distributed processing. You should ideally have a COBOL background and commercial systems experience.

## SENIOR PROGRAMMER to £5,000

You will be involved in designing and developing packages for use both on in-house mainframes and mini computers. (Training will be given.) You should have 2 years' COBOL experience gained in an ICL installation.

## SYSTEMS CONSULTANT to £5,500

This is a key appointment within our Clients' special accounting team. You will be involved in developing financial systems for the Group as a whole and working in close liaison with Senior Accountants. Applicants should ideally have:

- \* a sound understanding of accounting systems
- \* good communicative skills
- \* meaningful achievements in the accounting area
- \* a good educational background

## SYSTEMS CONSULTANT to £5,000 Plus Car

To support our Clients' development of mini computers they require a professional with a good mechanical grounding in mini computer software. Responsibilities will include the design of system software, as well as involvement in product and market specifications and pre and post sales support.

## SENIOR PROGRAMMER (Mini) to £5,000

This position will involve specifying and programming primarily in the area of systems software. Ideally you should have experience of Assembler and Basic gained in a mini computer or micro processor based environment.

All the above positions carry excellent terms and conditions of employment including flexible time, pension and a relocation package. North Humberside is one of the more pleasant areas within the United Kingdom offering a blend of coastal and country locations within easy commuting distance. The area also offers sensibly priced housing and good recreational facilities.

CONTACT: David G. Wade on 061-833 0427 or 0788 56013 outside office hours.

Ref: CW/9/78

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Freeport 6, 102, Blandford Square,  
London W1E 1JZ.

Computing  
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Association



## PROGRAMMERS £4,000 to £6,000 SYSTEMS ANALYSTS



INTERNATIONAL HARVESTER

### SOUTH YORKSHIRE — DONCASTER

International Harvester Company of G.B. Limited is part of a world-wide organisation and a major manufacturer and marketer of agricultural, industrial and construction equipment.

Attractive career openings for programmers and systems analysts have recently arisen in their large and advanced Information Systems Services Division at Doncaster, South Yorkshire. This Division is continually expanding its advanced systems and techniques in the areas of Data Bases, Communications, On-Line and Batch Processing through the use of a sophisticated Honeywell Level 66 Computer.

You should have a good educational background and for the analysis positions a sound knowledge and experience of commercial and/or manufacturing systems. Applicants for the programming positions should be experienced in the use of COBOL. In all cases a knowledge of advanced techniques i.e. Database, On-line processing or Communications would be an asset.

Salary will be negotiable according to experience and qualifications. A generous range of benefits include assistance with re-location where appropriate.

To find out more simply ring Len Cray (Reversing Charges) on LEEDS (0532) 444185. Alternatively write with brief career details quoting Ref: CW12, to Lorient Computer Services Limited, FREEPOST, LEEDS LS7 3YY (No stamp required)

## PROGRAMMING OPPORTUNITIES to £5,000 COBOL LEEDS

A progressive user of medium sized IBM hardware, based in Leeds has vacancies for additional COBOL programmers at various levels of experience. You will be given every opportunity to extend your range of expertise, using the latest techniques, in an expanding and exciting group environment.

Applications include sales order processing, accounting and production systems utilising CICS, RJE and remote processing.

### OUR CLIENT OFFERS YOU:

A very attractive salary package, four weeks holiday, flexi-time working and good company benefits, including relocation where applicable.

A continuous training programme is in operation designed to make the most of your potential. Attractive careers exist with our client for those wishing to remain in programming whilst the route to analysis is open to all.

### INTERESTED?

If you have COBOL experience to date then ring IRENE ROGERS on Leeds 444185 to find out more about these very attractive vacancies. Alternatively, write with brief career details quoting Ref: CW14, to Lorient Computer Services Limited, Freeport, Leeds LS7 3YY. (No Stamp is required).

## BUSINESS ANALYST POSITIONS — MERSEYSIDE

A major user of advanced DP systems throughout the company has a requirement for additional business analysts at several levels of experience. The company currently operates the latest large computer hardware with satellite mini-computers. Future hardware plans are extensive.

### PRINCIPAL BUSINESS ANALYST to £5,750

You will be responsible for a small team of business analysts and interface with technical and line management personnel. You may expect to work on a variety of projects and gain a broad understanding of our client's business.

### RESPONSIBILITIES

To help develop viable systems from feasibility through to post implementation review.

### REQUIREMENTS

Candidates must have a good academic record and several years systems development experience in a large company environment. An all round appreciation of business situations is also essential.

REF: CW15

In all cases our client offers an attractive benefits package with full relocation if required. Initial interviews will be held in Leeds, Liverpool and London to suit applicants. To find out more simply ring LEN CRAY (reversing charges) on LEEDS (0532) 444185. Alternatively, write with career details to date quoting REF: CW15 to Lorient Computer Services Limited, FREEPOST, LEEDS LS7 3YY (no stamp required).

These positions will appeal to non-technical DP analysts with a strong interest in business systems in their widest sense. You will be committed to the use of efficient systems, whether computer based or not, you will be concerned more with the impact of systems on the business rather than on technical content.

### BUSINESS ANALYST to £5,100

You may work either as a member of a team or alone on a wide range of business systems. You will be engaged on all aspects of analysis from feasibility studies to implementation.

### TRAINING

In order to improve your analytical skills our client offers on-going training in technical matters together with management training. Opportunities for career progression are extensive.

### REQUIREMENTS

A good academic background should be allied to at least two years' systems development experience. You may have a computer or O & M background.

REF: CW16

LORIENT COMPUTER SERVICES



OCS House,  
Servia Road, Leeds LS7 1NJ  
Telephone 0532 444185

## FERODO

### SENIOR SYSTEMS ANALYSTS

#### THE COMPANY

Ferodo Limited is situated in the Peak District — an attractive rural area with relatively low cost housing within commuting distance of both Sheffield and Manchester. We are one of the country's leading manufacturers of friction materials and — following continual promotion and development of new projects — are currently seeking Senior Systems Analysts to join us at our Head Office.

#### OUR COMPUTER

Ferodo Limited is part of the Turner and Newall Group and is one of the unit companies using a centrally located IBM 370/158 running under OS/VS1 and using IMS. We are shortly upgrading to MVS. Some of our systems are still running on our locally based ICL 1902T but these are rapidly being transferred to the central IBM machine.

#### THE JOB

The successful applicants will be involved in new developments concerning Factory Loading, Progress Control, on-line Order Processing and Group Accounting Systems which will include an on-line Sales Ledger. Full training will be given where necessary.

#### THE APPLICANTS

The job calls for 2-3 years' experience and achievement in commercial systems analysis, design, development and implementation. Educational requirements are qualifications at 'A' level standard or equivalent and preferably a degree.

We offer Competitive Salaries according to experience and suitability and the benefits package includes membership of the excellent Turner and Newall pension scheme, free BUPA membership, four weeks' holiday, assistance with re-location expenses etc. We work a 5 day 37-hour week — 8.35 a.m. to 4.30 p.m.

To find out more about this job, telephone our Systems and Programming Manager Brian Smith on 029 881 2520, ext. 320, or alternatively, write for an application form to The Personnel Manager, John Cowson, Ferodo Ltd., Chapel-en-le-Frith, via Stockport SK12 6JP.



## SYSTEMS ANALYST

An opportunity now exists to join Cummins Engine Company Limited, one of the World's leading manufacturers of high-speed diesel engines as a Systems Analyst.

Data Processing within Cummins involves the use of large Data bases to support on-line systems and if you are enthusiastic about the prospect of applying progressive techniques in a challenging environment then this position is for you.

The job involves all aspects of systems development from feasibility study through to final implementation and a successful record of several years' Data Processing experience is therefore essential. This is an excellent opportunity for an experienced Programmer seeking a first appointment in Systems Analysis.

Conditions of employment including salary are those expected by a major international company and include flexible working hours, 23 days' vacation, free life assurance and relocation assistance to this attractive part of the North East.

Applications, enclosing a detailed c.v. should be addressed to  
Joale Pottinger  
Personnel Supervisor



CUMMINS ENGINE COMPANY LIMITED  
Yarm Road  
Darlington  
DL1 4PY  
Co. Durham  
Telephone Darlington 60606



## Do you live around Manchester?

if so

and if you want an informal chat about your career as a programmer or analyst with our growing INDUSTRIAL COMPUTING AND CONTROL SYSTEMS DIVISION in the North West come and see us.

We will be at the Grand Hotel, Central, Manchester, anytime between 11 am and 8 pm on Monday 25th, Tuesday 26th and Wednesday 27th September.

Don't miss this chance to find out about Europe's leading systems house that really know about industrial computing.

If you can't come — ring 061 236 9559 or 061 442 9552 and ask for SPL. Battersea House, Battersea Road, Heaton Mersey, Stockport, Cheshire, SK4 3EA.



## Real-Time Programmers

### Are you good enough to support Ferranti's real time customers?

The Wythenshawe Division of Ferranti Computer Systems Limited are seeking several additional programmers for their small but highly important Customer Support Section. These positions offer a superb opportunity to develop their existing real-time software expertise to the full, and to make substantial contributions to the further development of Ferranti's sophisticated real-time operating systems and associated software.

The company believes in promotion from within, and technical staff can reach the very highest management levels in the company, which depends upon its technical expertise to remain at the forefront of technology.

### The job

The job of the customer support programmer involves the following main activities:

\* Operating system building and testing. This is a combination of product development and quality assurance, and real scope exists for original and creative work.

\* Software installation on-site, giving opportunities for short visits in the UK and overseas.

\* Problem solving.

The 'sharp end' of the business, requiring diagnostic flair, and the ability to work under pressure. Ideas for operating system improvement are often generated here.

If you have these attributes, the company will pay you well; and will give you every opportunity to progress. The rest is up to you. The offices are located on the South side of Manchester, in pleasant and rural surroundings. Assistance with relocation is available where necessary, and the usual large company benefits apply.

Please apply to Sampson Staff in the first instance, either by telephone (transfer charges if necessary), or letter. Initial interviews will be held in Manchester or London.

**Sampson Staff** 15 Piccadilly, Manchester M1 1LT. Tel: 061-832 4184. Evenings and Weekends — Tottington (020488) 2545.

### The candidate

The candidate who can accept these responsibilities should have most of the following attributes:

\* Experience of real-time mini-computer software, of probably not less than 18 months.

\* A real interest in the practical application of complex software.

\* A pleasant but firm manner, to enable businesslike relationships to be established with customers.

\* A talent for problem solving under pressure.

\* A degree, preferably in computer science or mathematics.

## FREE CONSULTATION on your next career step

Let's face it, the problem for many computer staff these days is not so much finding another job, as choosing the right job from a very wide range of possibilities.

Because of this, we make a point of talking to each candidate about their career ambitions, and we then select — with them — the most appropriate vacancies to put them forward for.

The result? The interviews you go for will be much more likely to be productive. On average, one in every two interviews with a client results in a job offer.

At the present time we are handling a lot of vacancies, mostly in the North, but with a significant number in the Midlands. An indication of the type of vacancies available is given opposite, but a phone call — transfer charges if necessary — to Arnold Sampson will rapidly determine whether or not we can help.

**Sampson Staff** 15 Piccadilly, Manchester M1 1LT. Tel: 061-832 4184. Evenings and Weekends — Tottington (020488) 2545.

**PROGRAMMING**  
Chief Programmers Hull, W. Yorks and Merseyside to £8800

Senior Programmers and Programmers Throughout our area, to £6000+ plus Glasgow

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Senior Analysts / Project Leaders Throughout most of our area to £7,500

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Senior Operators Manchester, Cheshire to £8,000  
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### THE UNIVERSITY OF AUSTON IN SUBSIDIARY

#### ANALYST PROGRAMMER

Applications are invited from ability experienced candidates (preferably for the post of Analyst Programmer) to the Administrative Data Processing Unit. The Unit is based on an ICL 2902 installation and provides the administrative needs of the University. The successful candidate will be responsible for the design, development, testing and implementation of the system. The successful candidate will be responsible for the design, development, testing and implementation of the system. The successful candidate will be responsible for the design, development, testing and implementation of the system.

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U.K. — O.S.  
Field / Site / Support  
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We require experienced computer terminals sales people to head our marketing operations in the Midlands and the North. These are senior appointments requiring a proven track record from people with a professional approach to selling.

We are a well-established manufacturing Company selling throughout the UK and Europe. Sales of our equipment have doubled every year and the appointed people can look forward to realistic targets, substantial commission and managers appointment in the near future.

An income between £8700 and £8600 will be offered together with a Company Car. Write to us giving brief details of experience, qualifications and a telephone number where we can tell you more about our success.

**TRANSDATA LTD.**  
International Sales Division  
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London  
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## William Key & Partners Limited

### LIVERPOOL • MANCHESTER • LEEDS

There is currently in the North of England an unprecedented demand for computer staff at all levels. We have a number of urgent requirements for experienced people to work on varied and interesting applications in all parts of the North. Excellent salaries are offered and total relocation expenses are often available.

#### WE HAVE THE JOBS — ALL WE NEED ARE THE PEOPLE

Telephone: Liz Segal on 061-834 2271 during office hours or 061-928 5495 evenings and weekends for a chat about your requirements.

William Key & Partners Ltd, 504/8 Corn Exchange Building, Corporation Street, Manchester M4 3DD

### WOODSOME PARK ASSOCIATES

is an expanding Computer Bureau situated in own grounds on the outskirts of Huddersfield. We offer specialised services to the Accountancy profession, Industry and Commerce and as a result of our planned growth, we now have vacancies for the following personnel:

#### ANALYST/PROGRAMMER

£ NEG

Required to assist us in the development and implementation of new and existing systems and packages. The person appointed must be an ambitious self-starter, keen to take initiative and responsibility in a stimulating, small team environment.

#### SENIOR OPERATOR

C.£4,000 p.a.

To take control of the day to day running of the operations section, reporting direct to the DPM. Candidates must have the flair and aptitude to develop and consequently grow within this important area.

Please apply, in confidence, giving full details of education and experience to: Roger Freeman, D.P. Manager, Woodsome Park Associates Limited, 4 Rowley Lane, Fenay Bridge, Huddersfield HD8 0JG.

### KEY OPERATIONS ASSISTANCE LTD.

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#### COMPUTER OPERATIONS PERSONNEL

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We have a first-class team of operators and data prep. staff available in the north to fulfill your requirements immediately at competitive rates.

For a fast professional service:

Ring 061-833 9343  
144 Royal Exchange Building  
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### COMPUTER SERVICES/SUPERVISOR

North Manchester. Salary: Negotiable with fringe benefits. Joseph Stocks & Sons is a major supplier and distributor of Danaher, Bacon and other quality hardware. The company is situated at Whitefield, North Manchester with easy access to the M62 motorway. We require an experienced computer professional to take control of our DIGITAL TOP 11 440 computer operating 10 terminals on line both locally and via the GPO network to a depot in Liverpool.

If you have experience of:

1. Digital Computers using TOPS reporting systems software
2. Basic Plus programming
3. Systems analysis and design
4. Working knowledge of sales order processing and all accounting functions
5. Control of On Line and Batch operations
6. Communications in teletype

We can offer:

1. Scope for initiative
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3. Interesting and varied projects
4. Pension scheme

Any person below the age of 25 or earning less than £4,000 annum would probably not have the relevant experience. Otherwise apply in confidence giving full details of your qualifications and experience to: The Secretary to the Directors, JOSEPH STOCKS & SONS LTD., 57 Stanley Road, Whitefield, Manchester M26 5GP.

### THE COWIE GROUP

have a vacancy for an

#### ANALYST/PROGRAMMER

The group will shortly be replacing IBM System 32 with System 34, further enhancement is scheduled during 1979 including additional terminals and real time operation.

We are looking to recruit an analyst/programmer with proven ability to assist in improving current in-house systems together with projected development.

Preference will be given to applicants possessing a sound knowledge of analytical techniques and RPG 11 relevant IBM experience would be helpful.

The salary is negotiable and conditions include use of company car.

Apply in writing to:

Group Accountant  
Cowie Group of Companies  
Millfield House, Hylton Road  
Sunderland Tyne & Wear  
SR4 7BA

## YORKSHIRE OFFERS MOOR AND MOOR ...AND MORE!

£4,000 — £4,500

#### LEAD PROGRAMMERS

1 — 2 years experience with proficiency in at least one programming language and its operating system environment.

£4,800 — £5,200 (+ PROFIT SHARE)

#### SENIOR PROGRAMMERS

Minimum 3 years experience and the ability to supervise up to 3 more junior staff. Working knowledge of two languages plus detailed knowledge of the operating system.

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Basic programming knowledge plus the ability to carry out analysis design for average complexity batch systems, and simple on-line systems.

ALL THE ABOVE ARE PERMANENT POSITIONS WITH THE NORTH'S PREMIER SOFTWARE HOUSE BASED IN ENGLAND'S PREMIER COUNTY

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### NORTH WESTERN REGIONAL HEALTH AUTHORITY

The Authority has an ICL 1904S Computer with 8K magnetic tapes 7X EDS60 with data communication terminals at various locations. The following vacancies are based at Gateway House and involve working on developments in Medical Computing.

#### SENIOR SYSTEMS ANALYSTS/SENIOR PROGRAMMER

Reference Number 1633/1

Salary Scale: £4855-£6025 per annum

Location — Initially Hope Hospital, Salford; later Gateway House

At least two years' experience of systems analysis and implementation of computer based projects, or be senior programmers willing to be trained as analysts. ICL 1900 or 2900 series systems experience an advantage.

#### PROGRAMMER

Reference Number 1633/2

Salary Scale: £4421-£5326 per annum

Location — Gateway House

Minimum of 2 years' programming experience required: knowledge of George III and/or FLETAB an advantage. Applicants with at least 1 year's programming experience or an H.N.D. in computer studies or equivalent will be considered for appointment as a Junior Programmer. Salary scale £3452-£4421 per annum.

Application forms and job description from Regional Administrator, North Western Regional Health Authority, Gateway House, Piccadilly South, Manchester, M60 7LP, quoting the appropriate reference number. Closing date 4th October, 1978.

### Health Care-Sheffield

Our Health Care team provides systems to help improve patient care and enable Doctors and Administrators to make better use of resources. The work ranges from immunisation and family practitioner systems to medical systems for individual Consultants. We need two additional experienced staff for this team. Applicants for the Programmer post should be experienced in COBOL.

#### Systems Analyst

£4,421-£5,326 ref. JAA 102

#### Programmer

£4,421-£5,326 ref. JAA 103

Most of our systems run on our large 1904S, but increasing attention is being given to distributed processing and use of small computers. The post offers pleasant working conditions (we are on the rural outskirts of Sheffield) superannuation scheme, staff restaurant, active social club, flexible working hours.

Application forms (to be returned by 6th October, 1978) and further details from the Regional Personnel Officer, Trent Regional Health Authority, Old Fulwood Road, Sheffield, S10 3TH, or telephone 0742 308511 Extn 226 Quoting appropriate ref. no.

Trent Regional Health Authority

## Make your DP experience count. £4K, £5K, £6K, £7K...

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The positions registered with P & S cover the whole DP spectrum, from COBOL programmers to systems analysts to high flying salesmen.

The locations are throughout the U.K. And the salaries?

If you can supply the experience, and

of course the ability, we can supply the jobs with the kind of salaries you are worth.

We do not have the space here to list the scores of opportunities we have on our books but whether you have been working for twelve months or twelve years we would like to hear from you.

And we think you will like what we have to say in return.

Write or telephone today. 24 hour answering service.

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London W1M 2DS

## Project Leaders

up to £7000

## Programmers

up to £5500

plus relocation to the North-west

We are a widely-diverse, rapidly expanding engineering organisation with a firm commitment to computerised techniques. We have recently enhanced our IBM 370/128 and are involved in defining our next generation of systems which will lead to on-line and distributed systems with on-line programming aids. We are now looking for experienced and enthusiastic men and women to supplement our current staff as we move positively into the future. Programmers must have at least two years background working with DDB and PL/I or COBOL or be able to demonstrate alternative relevant experience. This is a major career development step by sending your CV to Martin Price our Personnel Manager or write to him for an application form at Mather & Platt Limited, Park Works, Newton Heath, Manchester, M10 6BA.

Mather+Platt

## CLASSIFIED COPY

All classified copy should reach our offices no later than 5.30 pm on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.

Ring Jan Carter for further details on 01-261 8018

## Exciting Northern Vacancies

### HALIFAX SYSTEMS ANALYSTS

to £5,500

An expanding organisation requires an experienced analyst with either a commercial or manufacturing background. Programming ability (COBOL), design and implementation experience essential.

### SHEFFIELD PROGRAMMER

to £5,500

An experienced COBOL or FORTRAN programmer is required for a fast moving services environment. Language retraining available if required.

### SHEFFIELD SYSTEMS ANALYST

to £8,000

Our Client requires an experienced systems analyst with over 2 years systems experience, to complement their existing team. A good programming background is also required. Ability to liaise at management level essential.

### LEEDS I.B.M. SYSTEMS ANALYST

to £6,500

A top class system analyst required for an I.B.M. installation. Knowledge of C.I.C.S. and DOS/VSE would certainly be an advantage. Excellent prospects in expanding group.

### LEEDS PROGRAMMERS

to £5,000

COBOL Programmer required for a number of our existing Clients. 2 years commercial experience necessary in most cases. These positions would be ideally suited to persons who have experience on I.B.M. or I.C.L. kit.

### LEEDS PROGRAMMER

to £4,500

COBOL Programmer required for a fast moving and expanding installation currently installing new hardware. Excellent opportunity for career minded programmer.

### LEEDS SYSTEMS ANALYST

to £5,000

Our Client requires a systems analyst, with an excellent background in Production and Planning systems. The person required must have a good COBOL background, and at least 2 years successful systems experience.

"If you're considering a move then you should contact Lorien first."

LORIEN COMPUTER SERVICES



OCS House,  
Servia Road, Leeds LS7 1NJ  
Telephone 0532 444 885



## Barker & Dobson

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## Liverpool

Barker & Dobson are one of the leading companies in the country in the confectionery and retailing industry, with outlets throughout the UK. The company has a tremendous commitment to data processing, with the DP department situated in their Liverpool Head Office, serving a number of sites in the North West. They are currently consolidating the present systems on their ICL 1902S and

preparing for their proposed move to an ICL 2900 machine in the very near future; they will be embarking on a new development phase, which will include a move into production systems and a much greater use of on-line techniques. They therefore need a number of additional staff to ensure the success of both the move to new equipment and their future development plans.

### Systems Analysts

c. £5500

Two analysts are needed and applicants must have developed at least one major system and should also preferably have a programming background. They will be responsible for leading project teams of a number of systems and will, initially, be heavily involved with a number of user departments.

Apart from the salaries quoted and the opportunity to be in at the start of the new systems development, the company also offers a number of other attractive benefits, such as Flexidrive, BUPA Membership and 26 days' holiday a year. Assistance with relocation can also be given where necessary.

For further details contact Ruth Cayley at Quadrant Recruitment Ltd., Ashley House, Ashley Road, Altrincham WA14 2DB. Tel: 061 828 8302.

### Chief Programmer

c. £5500

Candidates must have an ICL background, probably with a minimum of 4 years' experience of both COBOL and Plan and also of on-line techniques. The successful applicant will be responsible for all programming resources and for the investigation and evaluation of new software and techniques.

### Senior Programmer

c. £4500

Candidates for this position should have around 2-3 years' experience of COBOL, preferably on ICL equipment. Any knowledge of Plan would also be advantageous. The person appointed will be responsible for assisting in the training of junior programmers and will report directly to the Chief Programmer.





# PROGRAM IN WEST YORKSHIRE

Opportunities exist for Programmers, with at least one year's experience, to work on projects involving the latest data processing equipment and techniques.

**THE COMPANY:** offers excellent promotion prospects, full training facilities, generous relocation expenses, and highly competitive salaries.

**THE AREA:** has the Yorkshire Dales, Headingley Cricket Ground, Pannal Golf Club, Leeds United, and plenty of attractively priced housing in very pleasant surroundings.

**SYSTEMS ANALYSTS:** at all levels are also required, and our client is prepared to pay top salaries for the right people.

*Please call or write to:*  
Rosemary Brown,  
Headrow Recruitment Consultancy,  
93 The Headrow, Leeds LS1 6EF.  
Telephone: (0532) 457377  
(24 hour answering service.)

July 1978

## CENTRAL DIVISION

### TEAM LEADER (COMPUTER LIAISON)

Salary £4,821-£5,181  
(+ £312 p.a. supplement)

Based in Warrington, you will be responsible for the Division's computer operations which are on-line from the Authority's computer centre in Warrington through an J.C.L. 7503 terminal, and also for data preparation.

To apply: Telephone the Division's Personnel Department at Warrington 53922, ext. 249 an ask for an application form.

Closing date: 9th October, 1978.

The above post is open to men and women.



### SENIOR PROGRAMMER AND ANALYST/PROGRAMMER

Wakefield (W. Yorks.) Salary Negotiable

We are

- long established manufacturers of mining and crushing equipment
- listed in the world's largest corporations
- listed via R.J.C. terminal corporate computer centre (Pittsburg, USA)

We require:

- a SENIOR PROGRAMMER to supervise the work of trainee and junior programmers
- an experienced ANALYST/PROGRAMMER wishing to broaden his experience in a challenging environment
- an AMBITIOUS capable PROGRAMMER seeking to further develop his career.

We offer:

- highly competitive salary
- planned career development
- excellent PROMOTION PROSPECTS.
- FULL RE-TRAINING where necessary.
- IBM 3033/MVS experience.
- interesting development programmes
- pleasant working conditions with a small friendly department.
- attractive location with reasonably priced housing and easy access to the motorway system (M1 and M62).

If you have

- previous ANALYSIS or COBOL or ASSEMBLER programming experience.
- the ability to quickly learn new techniques in a rapidly changing environment.
- the drive and personality to succeed in a KEY position.

Then we would like to hear from you.

Telephone: P. Hens, Computer Service Manager, Wakefield 75133, or write for further details to the Director of Personnel.

BRITISH JEFFREY DIAMOND  
Thornes Moor Road, Wakefield, W. Yorks. WF2 8PT  
Division of Dresser Europe S.A. (UK Branch)



### SEVERN recruitment SYSTEMS ANALYST LEEDS c£6,000

Our client, part of a major engineering group specialising in the design and manufacture of heavy mechanical handling equipment, has an interesting and challenging opportunity for a Systems Analyst to look after their new Honeywell 62/20 installations which are currently being commissioned.

Reporting to the Company Financial Manager, he/she will co-ordinate the computer system development throughout the Company, promoting the standardisation of systems and liaising with senior management and user departments at several locations. Accordingly occasional travel may be necessary.

The successful applicant, aged 26 to 30 years, will have a minimum of 3 years' experience of analysis, design and implementation of systems in a manufacturing environment.

Please write, enclosing full curriculum vitae, stating any companies to which you do not wish your application to be sent, to:

Joan M. Swaine,  
Recruitment Executive,  
Severn Advertising (Northern) Ltd.,  
Rooley Lane,  
Bradford BD4 7SP.

### A LEADING NORTH-WEST SOFTWARE HOUSE

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### ANALYST PROGRAMMER

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Closing date 5th September 1978.

Application forms available from and returnable to:

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### PROGRAMMER

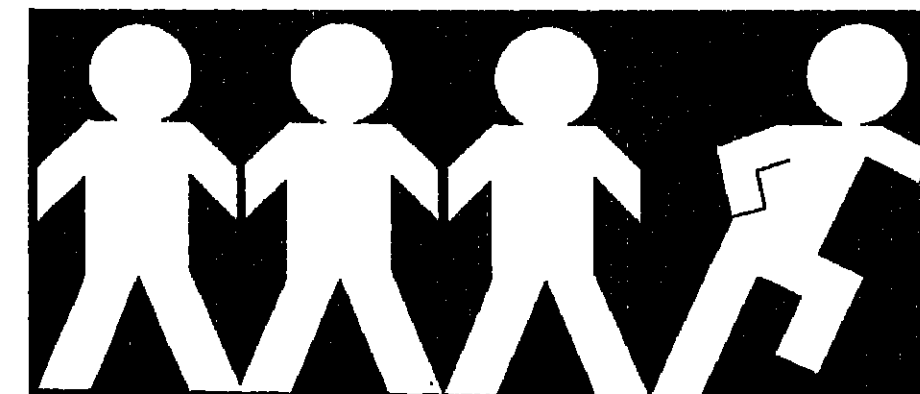
A graduate programmer is required who can make an immediate contribution to the writing of a suite of programmes currently under development with application to 'dairy' and general farm management. The suite is part of a dairy automation project being undertaken in collaboration with N.I.A.E. and sponsored by the N.R.D.C.

Experience of a fundamental language, such as Fortran, is required and working knowledge of micro computer assembler coding would be advantageous.

The successful candidate will be required to work under remote supervision but can expect to take responsibility for the subsequent programme maintenance and to respond to the need to specify and generate new programmes as required, within the system guidelines.

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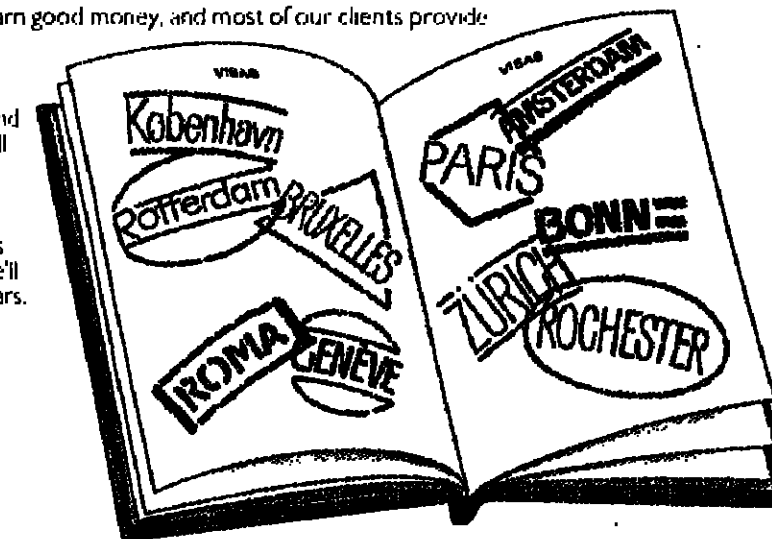
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IBM PL/1 + OS - S. Coast  
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PDP RSXII MACRO 11 - Kent  
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01/21/78

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The hardware is a (20-bit) bit-slice single board processor which must be fully tested in a simulated environment. The task will be to produce test-factors and the software required to execute the hardware tests. Applicants should have a sound digital logic background although not necessarily with bit-slice processors. An ability to quickly assimilate information relating to new technology and to integrate well into the existing team are therefore of prime importance. Familiarity with development and/or testing procedures in a similar environment would be advantageous. The educational level of applicants should be at least ONC/HNC. Ref. JHB 110777A

**MICROPROCESSOR INTERFACE PROGRAMMER/ENGINEER** C £11,500 p.a.  
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**BIT-SLICE SYSTEM SPECIALIST/AMD 2900** C £11,500 p.a.  
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(Ref: JDHI) Jenny Dalrymple-Hay, Beaconsfield (04946) 4579 (Home)

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An exciting opportunity has arisen for a systems analyst to work on line systems for our client, a major international company based in Berkshire

You will need around 3-4 years experience, preferably on IBM equipment, and you should ideally also have a programming background

Our client has attractive offices and is offering excellent fringe benefits together with a realistic salary.

Our client, an expanding software house, wishes to recruit a number of programmers with at least 2 years experience of writing in COBOL or RPG for IBM or ICL hardware. **to £6,000**  
Time spent with a software house will enhance your career prospects by giving you the opportunity to work on a wide variety of applications to professional standards.

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Ref. RW 38/1

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My client is a small systems house which specialises in the development of total systems based on PDP/11 hardware under RSX-11M. Systems are developed in RTL/2, Coral and Macro, and increasing use is being made of Intel 8088 microprocessors.

The company is young and small, so the working environment is congenial and stimulating. Your security is the financial backing and commitment of a major industrial concern. Your key to success will be your own talent and hard work.

There are openings at all skill-levels, and to reflect this, salaries up to and including £7,000 will be paid in appropriate circumstances.

Please contact me, TONY BAKER, on 01-499 4501 (24-hour answering service) for an initial discussion.

Ref: RW 38/2

## CONTRACTS

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Ref: RW 38/3

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All positions are based to the West of London, although lecturing assignments in other parts of the UK (and occasionally Continental Europe) will sometimes arise.

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Ref: RW 38/4

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- ★ Travelled to Zambia on systems duties

Geoff is looking for an Assistant Analyst to help him develop his Engineering Project — potentially into ON-LINE and DATABASE. This position would suit an ambitious Programmer wishing to move into Systems or a Junior Analyst looking for more scope.



I'm MIKE — In 20 months at Charter

I have:

- ★ Been promoted
- ★ Increased my salary substantially
- ★ Worked on a multi-national currency dealing project using mini computers
- ★ And I shall shortly be travelling to Luxembourg on programming duties

Mike is looking for colleagues to work on several developments, including Geoff's, all involving new technology. A sound knowledge of COBOL is required for all programming posts.

CHARTER CONSOLIDATED is a major Mining Finance Company based in Ashford in Kent with worldwide connections. The Computer Centre operates an IBM 370/138 under DOS/VS with CICS/VS and POWER/VS and Computer Services are provided to many industrial subsidiaries as well as Charter itself, via an expanding RJE network. Plans calling for the installation of an IBM 3790 Distributed Processing System have already been approved and many other developments are envisaged.

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## JBA

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Ideally the candidate will have a combination of experience with commercial systems development, selecting and modifying manufacturers software and design/implementation of a distributed network. Although this is a senior position, the job will involve a high degree of technical work, particularly in the initial stages.  
Knowledge of one or more European languages would be an asset.  
Generous salary and fringe benefits. Contact: Jim Baker

### Consultants Information Retrieval Systems

London based up to £8,000  
One of the UK's most established consultancies wish to appoint consultants with experience of computer information retrieval systems. The company is looking for technicians with a computer background but who have been involved in the implementation of a system in a library or documentation centre. Candidates should have some knowledge of at least one proprietary package in the field, such as STAIRS, STATUS, DIALOG, ASSASIN or ORBIT. Applicants will be expected to have the personality and communications skills to carry out client projects without detailed supervision. They should also be able to contribute to the continuing development and marketing of packages and services in this area. This is an opportunity to join a stimulating company with variety of work and good staff benefits. Contact: Margaret Stevens

### Trainee Product Specialist

South East Herts c £4,500 + profits  
This small but highly successful company now has room for one extra support programmer to join their team. Their business is customizing totally "soft" and extremely powerful micro-based intelligent terminals so once you have proved yourself, a great deal of travel as well as design and programming work will be involved.  
Backed by a parent company in the USA, their growth has been tremendous, so there is a good deal of scope for individual career development — around £6/K + car can be expected within eighteen months to two years.  
An ideal opportunity for a graduate with about 1 year's experience of Assembler, preferably on minis or micros. Contact: Andy Wright

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

**JAMES BAKER ASSOCIATES, International Personnel Consultants**  
16 Maddox Street, London W1L Tel: 01-491 4478

### IBM COBOL Programmers

Kent/London minimum of £6,500  
Our London based client is a recently established software house, which already has a number of major contracts. The long term aim is to move into software development for which plans include the installation of a PDP 11 minicomputer.  
The immediate requirement is for COBOL programmers, with a minimum of eighteen months IBM experience, to join their project team in Kent. Extremely generous salary packages are offered, with additional help available for relocation. Minimum basic salaries will be £5,000 pa, plus bonuses and profit share amounting to approx £1,500. More senior individuals can expect much greater rewards.  
A phenomenal chance to be in at the start of what promises to be an extremely successful venture. Contact: Andy Wright

### Senior Analyst Analyst Programmers

to £6,500  
up to £5,900  
up to £5,000  
Herts/Essex borders  
Our client, one of the foremost travel concerns in the UK, is expanding their department in order to carry out further major development of on-line and database systems. They currently utilise an IBM 370/138 running under DOS/VS with a teleprocessing network using SHADOW and DL/I. Bright and ambitious systems and programming staff are needed to augment existing teams. In return for skills in COBOL and analysis our client can offer the opportunity for programmers to become involved in team leadership, while fully-fledged analysts will take on project/management responsibilities. Attractive fringe benefits include cheap holidays. Contact: Margaret Stevens

### NEW YORK

Systems Analysts circa \$29,500  
We are seeking a number of systems analysts to undertake a project in the USA for a period of up to 18 months. The client is an international banking organisation based in New York.  
Candidates must have direct experience of foreign exchange system, plus general banking and financial knowledge. The system will be implemented on large IBM370 equipment.  
Interviews will be held in London and visas will be arranged for the successful candidates without delay. Contact: Mike Creamer





Data Processing Recruitment Consultants

## Mark IV or IMS Washington, E.E.C., Scotland, London

Salary: \$30,000 + + (U.S.), £15K + (E.E.C.)

A prestige Multinational U.S. client require for their Washington office Mark IV programmers with at least two years experience. This position is permanent and the appropriate VISA will be applied for by the company.

Additionally our client seeks IMS (DB/DC) programmers, Analyst Programmers and Systems Designers for their Swedish, London and Scottish offices. In particular they require applications

specialists and one or two IMS internals Systems Programmers familiar with performance and prediction standards.

Successful candidates are likely to be either graduates or have a very extensive solid background in advanced computer applications and should preferably be available by November. Interviews will be held in London early October.

Ref 25A

## Mini + Main-Frame Programmers Manchester + London

Salary: £6 - 9.5K

Our client is a major international company recognised as market leaders in their field and has retained Logistix to assist in recruiting the following key project team specialists: Real-time mini programmers, Data base designers, compiler specialists, communications experts (Mini and Mainframe) Application and Software programmers. Experience of any of the following will be especially welcome: RSK-11, RTL11, BASIC, ASSEMBLER, PL/I, COBOL, IMS and

D.B. For those who enjoy overseas travel there will be ample opportunity to visit European and Middle East locations at which our clients have offices. Successful applicants are likely to demonstrate qualities of leadership potential, determination and be self-starters. It is anticipated that you will achieve very rapid promotion within this prestigious company.

Interviews will be held as soon as possible and offers will be made within 1 week of interview.

Ref 25B

## Message Switching + Communications London, H.Counties or E.E.C.

Salaries: £6.5 - 11K

A prestige International Client is seeking to expand and establish new project teams working on wide and varied applications areas with emphasis on Data Communications, Message Switching and Mini Software.

Can you picture yourself working in the forefront of mini systems applications and software development? Become a member of one of numerous specialist project teams in which you will make a valuable contribution whilst at the same time expanding your own frontiers of knowledge and experience.

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Successful candidates are likely to be either graduates (Computer Science or Maths) or have a very solid background in advanced computer applications and are probably aged between 23 and 33. You are presently likely to be either a Systems Designer/Consultant, Analyst Programmer or a programmer in a Mini computer environment with extensive Assembler experience. Any specialist expertise in the areas of Data communications, Message switching, computer networks, Process control or Mini computer software will be considered particularly advantageous.

Ref 25C

## IMS + Database Germany + London

Salaries: Germany £15K + London £7K +

One of the Worlds foremost Software Specialist Groups (not body shop) with H.Q. in the U.S. have asked Logistix to identify top calibre IMS programmers up to Team Leader level and beyond for permanent positions in Germany and London with the option to transfer for a limited or extended period to the U.S.

Suitable applicants must have current IMS (DB or DC) applications or systems programming experience using COBOL, PL/I, or BAL with DL/I. It is anticipated that candidates will have worked

with IMS applications for 2 years or longer. Applications cover on-line enquiry systems, banking, sales ordering, stock/inventory control, budgeting and forecasting etc. The scope of projects and the prestige of working with this acclaimed Market Leader will be certain to appeal to the most demanding career minded individuals.

The high salaries reflect the prominence which our Client places on the acquisition of these key personnel who are certain to rise rapidly to Consultancy or Management levels.

Ref 25D

## PL/1 Programmers City of London

Salary: not less than \$6K up to 9K Plus Mortgage

An Important International financial institution based in the City is expanding its team members and is seeking PL/1 programmers at all levels up to and beyond team leader level. Ideally, you will have around 3 years of solid PL/1 experience under O/S and will either have on-line expertise or a desire to move into this area of Data base design through participation in our Client's training programme. Of particular importance is the ability to work as a

member of a specialist project team under strict documentation and programming standards. A second language (COBOL or Assembler) would in addition be considered advantageous.

Our client offers a 2 1/2% subsidised mortgage, personal loan scheme, private health and a non-contributory pension plan. Interviews will be held in London during the next 3 weeks.

Ref 25E

Logistix, Freeport 32, London W1E 3YZ  
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(Reverse charges)  
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# Programmers

before you  
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mow the lawn,  
walk the dog,  
or pop out to  
the pub this Sunday..



When you're looking for a career move, it isn't always easy to take up the best opportunities. You may not want to commit yourself in writing and you can't phone during office hours because even the walls have ears!

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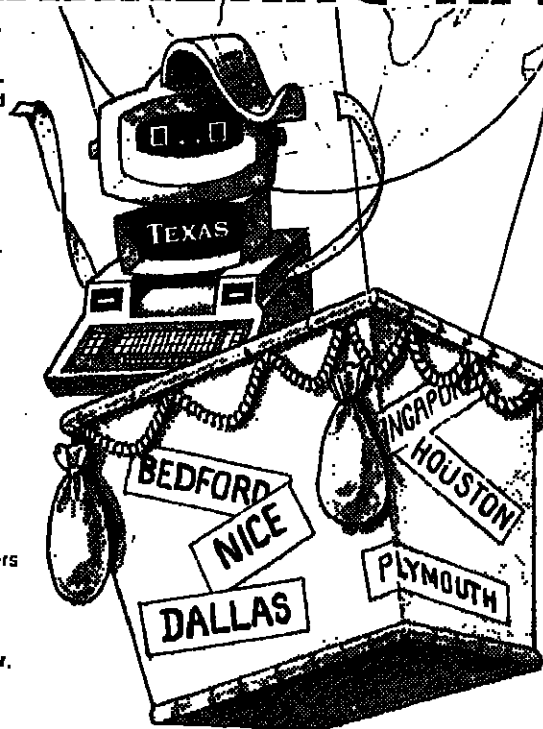
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#### Systems Analyst

#### Birmingham Area

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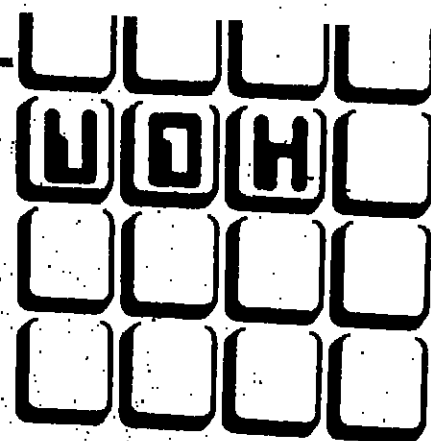
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Our client, an International leader in digital communications systems, is looking for Analysts/Programmers with at least three years' experience in computer systems. They will be required to develop software, to diagnose faults "on line" within the hardware and digital computer systems which contain a large number of specialised peripherals. If you have a hardware/software background, our client would be particularly interested in hearing from you. Our client's offices are based on a beautiful part of the South Coast where moderately priced housing is available. The Company offers a superb relocation package, and a career structure tailored to suit your specific expertise. In the first instance, please ring Peter Findlay on 01-373 6030 Ex G11 or write, quoting ref. PP.15.

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**ATA COMPUTER RECRUITMENT**  
ANGLIA HOUSE, 26 FREDERICK STREET  
EDINBURGH EH2 2JR

LONDON (01) 637 0781 MANCHESTER (061) 832 5856 BIRMINGHAM (021) 643 1994  
BRISTOL (0272) 211035 EDINBURGH (031) 226 5381 CRAWLEY (0293) 514071

031 226 5381



## Programmers

£3,732-£4,632 (inclusive) 2 posts

In Full-time  
In Part-time

The computing group provides a technical advisory and programming service to both the engineering and management departments of the County Council. It has a wide range of computer facilities including a remote batch terminal, teletype, graphics, programmable calculators and electric card punches. Considerable use is made of the County's own 1904S and 1904S computers which are in place since early in 1979 and also of computer bureaux.

Two programmers are required: one familiar with FORTRAN and/or BASIC, to provide assistance with a full range of support in the field of highway and structural design; the other preferably experienced in COBOL and/or FILETAB to assist systems analysts develop management information systems, including the use of database techniques.

Essential qualifications are a formal education to 'A' level standard and a minimum of 2 years' programming experience in the relevant field.

## Technical Assistant

£1,821-£3,651 (inclusive)

To assist with data preparation, terminal operation, program running and many other technical and administrative aspects of day to day work.

Applicants must have 'O' level education, be well organised and be able to work to tight schedules. Some experience of computer operation would be an advantage.

For further details phone John Hennessey, Maidstone (0622) 671411 (ext. 3756).

Job description and application form returnable by 6 October from the Personnel Officer, Highways and Transportation Department, Kent House, Lower Stone Street, Maidstone (closed quote ref. 24260).

## COMPUTER ENGINEERS

FOR THE WEST COUNTRY

Western Accounting Systems - A rapidly expanding computer sales company require experienced field service engineers able to repair to chip level and maintain their range of Disc based Mini Computers at customers installations around the West Country. If you feel that you have the sort of experience which we are looking for then please contact either Richard George or Roger Ford on 0934 416388 or write to:

**WESTERN ACCOUNTING SYSTEMS LTD**

A Villacote Road  
Weston-super-Mare, Avon

## SENIOR PROGRAMMER

Salary up to £7,230 per annum

CAN YOU HANDLE AN ON-LINE SYSTEM?

Thames Valley Police are looking for an experienced Senior Programmer to perform development and maintenance work on a computer on-line system. A challenging series of extensions to this system and to associated IDS batch programmes is envisaged.

The successful applicant will have extensive COBOL experience on an on-line system, preferably but not exclusively with Honeywell 6000/level 86 using IDS & TOS. He/she must be willing to take an increasing interest in the maintenance of existing software and be capable of working to high standards. He/she will also have the ability to communicate at all levels.

Over 6 weeks' holiday; pension scheme; assistance towards removal expenses.

Application form and further particulars from: Joseph Personnel Officer, Thames Valley Police, 100, Kington, Oxford OX5 2NX (Tel. 01493 401287).

# 'People who work in RPG II should not become nursemaids'



[Altergo Business Systems, 1st Career Principle]

Working on one installation for one user, that's just what happens, right? You put all your skill in and once the system's set up there's not much left to stretch your ability. Time, perhaps, to move to a more demanding situation which never lets up on you: Altergo Business Systems.

We're an autonomous company within Altergo, the most professional software group in this and thirty other countries. We're young, aggressive and talented — established as the specialist leaders in RPG II in a relatively short time — and we're looking for analysts and programmers who think they can match our reputation.

Tedium is one thing that's not part of our career plan for you. For a start you'd be changing project no less than every nine months. Which means a lot of different problems, on constantly varied applications in different industries.

Then there's equipment. We want people experienced on hardware extending from IBM 3234 to system 3 Model 15D and we can promise you the most contemporary hardware available. And finally, your commercial prospects. Leaders we may be, but we've only just started towards our long term aim. Join us and we'll be asking for an enthusiastic commitment to a policy which seeks out and recognises individual achievement. Within the structure, there's no limit to where you can go.

Geographically, you could stay in your general location or travel far and wide. Either way you'll be well paid. Come and talk to us if you have ambition and you want career scope. Contact Barry Whitesman on 01-734 9681 for interviews in London, Birmingham or Manchester. Or write to him at: Altergo Business Systems Limited, Warwick House, 38 Soho Square, London W1.

# altergo

## SALES EXECUTIVE 10K + VOLVO CAR

This Dynamic American Company has opened an office west of London and is looking for 2 young salesmen to spearhead its approach on the U.K. market.

Whilst experience of IBM Mainframe (or PCMC equipment) would be a distinct advantage, candidates with a successful sales record in the field would be actively considered.

PHONE NOW — (Mums answer until 8 p.m.)

## SUPPORT SPECIALIST

c. £8,750 + car

Frequent travel to Europe and Florida, U.S.A. At least 3 years' Assembler required, previous experience in trouble-shooting of real-time systems, or typesetting/word processing background would be desirable.

If you can meet this demanding yet rewarding challenge, contact Terry Welch, Technical Support Manager, at:

**E. M. Grant Scarfe, Personnel Manager**  
**Harris Systems Limited**  
145 Farnham Road, Slough, Berks. SL1 4XD  
Slough 34666



## MEMO



To **TRAINING OFFICERS**  
Subject **CORAL 66 COURSES**

The next Systems Designers CORAL 66 training course is on

\* 30th October in Farnborough Hants.

Cost: £210 - Residential: £315

One week intensive course produces effective CORAL programmers through the use of proven, worked examples.

Course organisers are premier suppliers of CORAL 66 compilers to industry.

Details from Corinne Rixon  
Systems Designers Limited

Systems House, 1 Pembroke Broadway, Camberley, Surrey. Telephone Camberley (0276) 62244.

# COULD YOU TEACH SOFTWARE?

If so, the reading of this advertisement could be the smartest move in your career. You may or may not have had teaching experience. You will have been involved in commercial or real time software systems.

## Who are we?

We are Educational Services, an important part of Digital Equipment Co. Ltd., the world's largest manufacturer of mini computers. Our training centre in Reading has 18 classrooms, 30 dedicated computer systems and a staff of more than 70 people for running both hardware and software courses.

## What do we do?

Our software courses cover:  
— introduction to mini computers  
— programming languages (Assembler, BASIC and COBOL)  
— real time and commercial applications  
— in depth instruction on the internal workings of our own software operating systems (RSX-11, RT-11, IAS, RSTS and VAX/VMS).

## What do you need?

If you consider you have the ability to contribute in these areas we will give you the training and opportunities to develop.

## What do we offer?

An exciting and challenging job in a friendly atmosphere with ample opportunity to develop technically or into management. The salaries being offered are between £5,600 and £7,500, according to experience, and the fringe benefits package, including assistance with relocation where appropriate, is that to be expected from a progressive international organisation such as Digital. For further information please call Ann Jones on Reading (0734) 583555 Ext. 3462, quoting ref. no. 440; or write to her at Digital Equipment Co. Ltd., Fountain House, The Butts Centre, Reading RG1 7QN.

## MYRIAD APPOINTMENTS LIMITED

Computer Personnel Consultants

## OPPORTUNITIES IN THE CITY... TO £8,000

Our client, a successful computer bureau offering a wide range of services, primarily to the investment community wishes to recruit top class professionals to its growing staff. Immediate plans include the upgrade of the mainframe hardware to an IBM 370/148 and considerable enhancement of its facilities including the use of IBM Series 1.

## SYSTEMS PROGRAMMER

To £8,000

You must be able to offer solid Assembler experience, ideally gained under DOS/VS, although experience of a compatible language would be an acceptable alternative.

You will join a department using IBM ASSEMBLER to develop some of the most advanced investment services available in the world. The company offers excellent working conditions and the technical challenges of the fast moving bureau environment. A policy of promotion from within will enable you to develop a career path related to your own efforts and abilities.

Ref. H3/2109

## APPLICATIONS PROGRAMMERS

To £6,000

You must be able to offer solid Assembler experience, ideally gained under DOS/VS, although experience of a compatible language would be an acceptable alternative.

24-hr. answering service  
Please telephone for a confidential discussion or write to:  
30 Fleet Street London EC4Y 1AA  
01-353 0981

## OPERATOR / PROGRAMMER

\* Minimum £4,200 p.a. + £5.25 Lvs per week  
\* Hours 8 a.m.-5 p.m.  
\* Plus usual benefits

West End Oil Company has an immediate vacancy for an Operator/Programmer aged 23+ wishing to learn Data Base Programming. Successful candidate, male or female, will have operated an IBM System 3 Model 15 Computer for a minimum of one year and have some R.P.G. II programming experience. It will be an advantage for candidates to have completed an appropriate IBM programming course. Please telephone Miss S. Miller on 01-437 9876 for an application form.

Caltex (U.K.) Limited  
30 Old Burlington Street  
London W1X 2AR



## DUNDEE COLLEGE OF TECHNOLOGY COMPUTER CENTRE

Applications are invited for the newly established post of

## SYSTEMS MANAGER / Deputy Director of Computer Services

arising from expansion and a recent reorganisation of the staff structure of the Computer Centre, which is responsible for all computer services used in the college. The main function of the post will be the management of the Analysis/Programming Section, which provides software for a variety of interesting technical and commercial applications, systems programming support and an advisory service to users of the college's DCSystem 20 and PDP-11 computers. In addition the person appointed will deputise as required for the Director. Applicants should preferably have considerable experience of leading a programming team and of computer services in higher education. Salary on the scale £7,155-£7,682 p.a. Financial assistance towards the cost of removal expenses may be payable.

Further particulars and application forms may be obtained from the Administrative Assistant (Establishment), Dundee College of Technology, Bell Street, Dundee DD1 1HG, to whom completed application forms should be returned by 9th October, 1978.

**KEY COMPUTER PERSONNEL**  
01 949 3140



TIMES NEWSPAPERS LIMITED

**SENIOR PROGRAMMER £7,000**

Times Newspapers Limited are currently implementing one of the most advanced computer based newspaper production systems in the U.K., utilising data base and real time techniques on a network of mini-computers.

A Senior Programmer is required who will be responsible to the group Data Processing Executive for all aspects of software development.

Applicants must have at least five years' mini-computer programming experience, preferably using Hewlett-Packard equipment, and be capable of communicating with all levels of staff and of planning and controlling software development projects. Additionally this position requires several of the following attributes:

- A working knowledge of FORTRAN IV and Assembler languages
- Experience of real time and database processing techniques
- The ability to write interface software for non-standard peripherals
- Experience gained in either the newspaper or publishing fields

Salary negotiable depending on qualifications and experience  
Please write with full personal and career details to

Desmond Hayes, Employment Manager  
TIMES NEWSPAPERS LIMITED  
200 Gray's Inn Road, London, W.C.1

**Software Analyst/Programmers****£4,400 to £5,800 - West Country**

Our client is seeking several Analyst/Programmers to join a small high-calibre team of software professionals. The team is at present working on the design, coding, testing and integration of software programs, with particular reference to Real Time applications.

These opportunities should be particularly attractive to men or women who possess the following qualifications:

- \* A minimum of HND in Mathematics, Computing Science or an equivalent qualification
- \* Experience of Real Time Software
- \* Experience of PDP 11, 40, 60, Argus 700 and Ferranti RM1000

\* Experience of Coral 66, Algol and Fortran.  
Attractive salaries depending on experience and qualifications are offered, together with a wide range of company benefits and realistic relocation expenses to a very pleasant rural part of the West Country.

Please write with full details to: Ref 643, Harrison Crowley Recruitment, 35, Queen Square, Bristol BS1 4LU. Please list on separate sheet companies to which your reply should not be forwarded.

**HCR**  
Bristol

**DUNDEE COLLEGE OF TECHNOLOGY COMPUTER CENTRE**

Applications are invited from suitably experienced persons for three posts

**COMPUTER OPERATIONS SUPERVISOR  
COMPUTER OPERATOR (TECHNICAL)  
COMPUTER OPERATOR (TRAINEE)**

arising from expansion and a recent reorganisation of the staff structure of the Computer Centre, which is responsible for all computer services used in the college. The main systems used are a DECsystem-20 for Timesharing and Batch and a PDP 11/60 for Real Time and Graphics applications. The Computer Operations Supervisor will be responsible for the supervision of the Operations Section, which provides support for the operation of computer facilities, including equipment operation and maintenance, data preparation, job control and assistance to users. Applicants should have experience of computer operations in a similar capacity. The salary scale will be £4,366-£4,773 p.a.

The Computer Operator (Technical) will assist with the operation of computer equipment and will also provide technical support for the installation and maintenance of equipment, including terminals, data communications and microprocessors systems. The salary scale will be £3,561-£3,831 p.a.

The Computer Operator (Trainee) will be a young person with suitable qualifications and aptitude for training in the operation of computer equipment. Initial appointment will be on the scale £1,884-£2,895 p.a., there is a provision for advancement to Computer Operator on the scale £3,279-£3,561 p.a. after satisfactory completion of the period of training.

**Assembler/Usercode Programmers  
Come to New Zealand****Large system project opportunities****£6000 - £7750**

The continued expansion of a large banking system requires us to find additional expertise.

You will join a successful project supporting one of the largest on-line systems in the Southern Hemisphere. This is a central system linked through three regional concentrators to a nationwide terminal system, soon to reach the 500 terminal mark with more to come.

Specifically we are looking for an experienced Assembler Programmer Specialist to support a central system 4 based on-line system using drive multi-threading techniques. Experience in teleprocessing techniques is an obvious advantage and applicants should be able to communicate easily with both technical and non-technical staff as this is a first line customer support function.

The project is based in ICL New Zealand's Head Office in the centre of Wellington City and overlooking the harbour. Reasonable relocation expenses will be reimbursed by the Company.

If you like the idea of plenty of sun and the outdoor life, away from crowds and commuting, then write to: Cate Hudson, International Division, ICL, Bridge House North, Putney, London SW6 3JN, quoting reference CW101, Tel: 01-275 7272 ext. 2047.

**International Computers**

think computers - think ICL

**Real Time Coverage Programmers**

Continuous expansion of BARS, our REAL-TIME COMPUTER SYSTEM, offers an opportunity for experienced men and women to join a small team of Coverage Programmers at Heathrow Airport to gain valuable experience in large real time system's control, data base management, and operations. Salaries will be in accordance with qualifications and experience and start around £4000 pa with opportunities for progression to more senior positions up to £7200 pa and beyond.

British Airways REAL-TIME COMPUTER SYSTEM provides a worldwide, round-the-clock Passenger Service System which includes Reservations, Departure Control, Fare Quotation and Ticketing. The system is currently based on 370/168 CPUs under the Airline Control Program (ACP) Operating System, with 42 x 3330 and 4 x 2305 online modules handling approximately 1 million enquiries a day from over 3000 on-line terminals. The introduction of more powerful processors is in the planning stage.

The main responsibility of the Coverage Programmer Group is to ensure that the stringent serviceability requirements of the system (over 99% up-time) are met. Coverage Programmers work closely with all programming groups, Operations and Engineering staff to control the system, and when necessary, rapidly diagnose system

problems and to take corrective action. This function may often be performed without recourse to other programming staff. Additionally, experience in systems programming, in the areas of performance monitoring, systems testing, establishment of control procedures, and for producing utility programs which contribute to the overall security of the system.

Candidates should have a minimum of 1 to 2 years commercial programming experience, preferably using Assembler language. Additionally, experience in systems programming, or systems initialisation, and control would be an advantage.

As one of the world's leading international airlines, British Airways offers excellent conditions of employment which include a holiday pay supplement, inflation-proof pension scheme, subsidised cafeteria sports and social facilities and favourable holiday air travel opportunities.

Please telephone 01-897 3346/3347 between 9 am and 4 pm for an application form or write quoting reference 2117 CW, MK to: Head of Recruitment and Selection, British Airways, PO Box 10, London Heathrow Airport, Hounslow, Middlesex, TW6 3JA.

British Airways welcomes applications from suitably qualified Registered Disabled persons.

**British airways**

**Bravingtons LTD  
SYSTEMS ANALYST**

This is an opportunity for an outstanding systems analyst with full programming experience to be responsible for all aspects of systems support.

To investigate and document present systems, write machine specification for machine manufacturers, specify programming, arrange software contracts, eventually control machine installation, programme testing user manuals, etc.

When the machine is on line you would be responsible for day-to-day control and investigation of further systems.

We envisage initially, stock control and sales analysis applications with eventual full accounting functions to be transferred to computer.

We offer the opportunity to become fully involved in all aspects of computer operations and management.

The rewards include free life insurance, free pension, 3 weeks annual leave plus statutory holidays.

Please write initially with full curriculum vitae to: Mr. J. W. Bexley, Chief Accountant, Bravingtons Ltd, 284/290 Brompton Road, London W1 3NX.

**Programmers****Salary up to £4,917**

The Computer Section is responsible for developing and maintaining a variety of systems on the Council's ICL 1902T installation with communications equipment. We currently have vacancies for three programmers.

**We want**

- \* Programmers with at least 6 months' experience COROL or PLAN
- \* Experience of ICL 1900, but programmers trained on other machines will be considered

**We offer**

- \* A salary up to £4,917 p.a.
- \* An annual leave entitlement of 20 days PLUS 1 day's leave per month
- \* Pension scheme, subsidised staff restaurant and other benefits
- \* Programming for an interesting variety of applications. Current developments include systems dealing with accumulation for the elderly, superannuation records, children boarded out with foster parents, and the introduction of online intercomparisons for sales and retail
- \* The opportunity to progress. If you show the interest and ability necessary, you will write program specifications and design small systems under the guidance of an Analyst or a first step into a Systems role.

Please contact John Allsop, Borough Treasurer's Department, 22-26 Chinnor Road, Ilford, Essex, U.S.A. Tel: 011 478 3020, extension 509 for an application form or ring David Hicks, Senior Analyst on extension 124 for further information.

**Redbridge**  
London Borough

**"Opportunities at Brintons"****COMPUTER PROGRAMMER**

Brintons Limited, a leading manufacturer of security systems, is looking for a Computer Programmer to join its established team. Currently working on an ICL 2904 machine.

The Company wishes to appoint an experienced Computer Programmer to join its established team. Currently working on an ICL 2904 machine.

Applicants, male or female, should possess a minimum of 3 years programming experience and must be thoroughly conversant with the use of Cobol. Some experience of Plan would be desirable, as well as experience of on-line applications on ICL 2904 machine.

A competitive salary will be paid, commensurate with the nature of the post together with other usual large company benefits. These include an excellent pension and life insurance scheme, and social and sporting facilities. In appropriate cases, assistance will be given with relocation expenses.

Please apply in writing, stating age, qualifications, experience and current salary to: The Personnel and Training Manager, Brintons Limited, P.O. Box 18, Exchange Street, Aldershot, Wokingham, Hants.

For a full and complete list of vacancies, please apply to: The Personnel and Training Manager, Brintons Limited, P.O. Box 18, Exchange Street, Aldershot, Wokingham, Hants.

**Brintons Limited**

**Isn't it time you KO'd that computer recruitment problem?**

From October 5th 1978

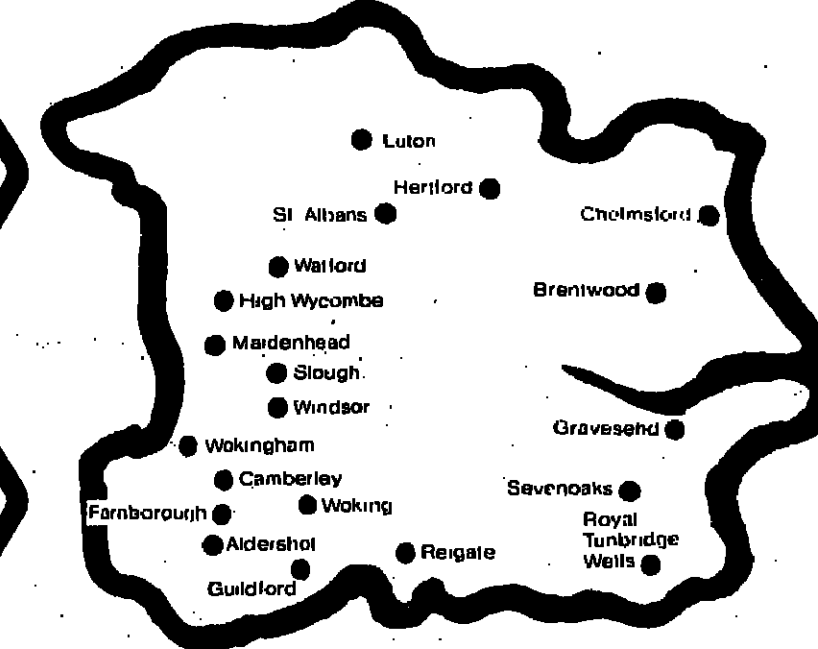
**COMPUTER WEEKLY announces THE NEW ONE-TWO**

**1 ON THE AIR**

46,000\* D.P. professionals in the Greater London radio area are told to watch out for your advertisement in that week's Computer Weekly!

**2 IN PRINT**

Your potential employee will have received Computer Weekly at home or at the office and can immediately turn up your ad!

**How the scheme works**

It's a unique opportunity to tie in your Computer Weekly recruitment ad, with a spot on popular Capital Radio - at very low cost. The radio ad will give tempting outline details of your company and the job you are offering - and will then refer the listener to the appropriate page of Computer Weekly.

**When it happens**

It will be broadcast during the morning breakfast-and-drive-to-work period on the Friday of the week in which your advertisement appears. Younger prospects, who are probably late-evening listeners, will already have heard it late on the Thursday night.

Each advertiser gets approximately 8 seconds of a full minute-long Computer Weekly commercial. So you share in the cumulative impact of sixty seconds of computer-oriented broadcasting time, at a fraction of the cost of a full "job-spot" commercial.

**Free production**

What's more, Computer Weekly will produce your commercial spot free of charge, with highly professional studio and production facilities.

**Cost and Conditions**

The rate is £120 for a commercial spot of approx. 8 seconds on Capital Radio on both the Thursday and the Friday of the week your advertisement appears. The copy date remains at 12.00 Tuesday for a broadcast on the following Thursday and Friday. Extraction of the key points from your advertisement will be done by our expert staff - unless you yourself have indicated the points for inclusion. Unfortunately the salary offered cannot be announced over the air, due to the dangers of an escalation in DP staff salaries. Demo tapes are available for seriously interested advertisers.

**RING CHRIS PRIOR ON 01-261 8028/8658/8000**

But hurry! Bookings are strictly rationed until Dec. 1978! Computer Weekly. The industry journal for the data processing professional.

\*Computer Weekly circulation in Greater London area Sept. 1978



## Computer Analyst

Peter Anderson

Our client, who is a big name in the Construction Business, require PROGRAMMERS AND ANALYSTS/PROGRAMMERS for their D.P. Department in New Malden, Surrey.

The installation, an NCR 75, uses both Neat/3 and Cobol. Development is in progress on an interactive on-line communications system written in Cobol with Neat/3 being phased out.

Programmers are required with 18 months' experience of Cobol on any machine, or Neat/3 people who would like the opportunity of training. Analysts are required to have at least 1-2 years' involvement in Analysis work.

Salaries for programmers are negotiable around £5000 and £6000 for Analysts with the usual big company benefits.

## Computer Analyst

Up to £7,400

An international Systems House, who have offices throughout England and Western Europe, need ENGINEERS for their Micro Division.

The roles are varied but could include:

- ★ Evaluating
- ★ Commissioning
- ★ Interfacing the latest American Boards
- ★ Assessing client needs
- ★ Producing sales aids
- ★ Training Micro users

Their benefits include 4 weeks' holidays, staff mortgage service, group health insurance and regular salary and promotional reviews. Removal assistance is available where appropriate.

Ref CW/37/7

## Micro Division

A major international Systems House, who are better known for their mainframe work, have a fast expanding Small Business Systems Division.

They have an urgent need to recruit people who range from Programmers with 2-3 years' experience, through to Senior Project Leaders.

All you need is experience of ASSEMBLER on any machine, but if you have experience of SYSTEMS DESIGN, REAL-TIME ORDER ENTRY, or ORDER PROCESSING so much the better. Projects are all based on Real-Time APPLICATIONS on the ICL SYSTEM 10 and SINGER 1500 hardware.

Project teams usually consist of 2-3 people, allowing you to follow the project from specification through to implementation.

Salaries are well above market rate and the company can offer excellent career opportunities. Annual Bonus, plus usual Company Benefits one would expect from a company of this size.

Ref CW/37/4

Systematic  
Programmers

Wokingham

Our client, an international manufacturer, has a need for Systems Programmers with IBM, ICL or DEC hardware experience. You should be conversant with more than one major hardware and software system. You should also be capable of understanding the characteristics of complex software. Your work will include:

- ★ Evaluating software packages
- ★ Testing out software facilities and performance
- ★ Writing middleware and basic software products
- ★ Advising and supporting application programmers

Therefore, we would like to hear from Systems Programmers with at least 2 years' experience who would like the opportunity of being involved on more than one operating system and more than one piece of hardware. Attractive salaries will be paid to the successful candidates.

Ref CW/37/5

Production Control  
Software Developers  
'Minis'

Germany

to £16,500

A unique opportunity has arisen based in Germany, for experienced professionals to join a project team being formed to improve an existing operating system and develop a Production Control Package.

The ideal experience may come from a variety of backgrounds in software development or production control, but will probably include some of the following:

Operating Systems, Interpreters, T.P. Monitors, File Handling, Database Techniques, Utilities and obviously Real Time Production Control on Minis.

Candidates with Production Control experience must be able to understand the requirements needed and specify the necessary solutions.

Ability to speak German would be useful but will not be a stumbling block. Relocation expenses will be paid to the successful candidates.

Ref CW/37/4

Real/Minis  
Assembler

Middlesex &amp; European Travel

£6,000

Our client, based in Middlesex, is involved in a specialist area of the OEM market. We wish to recruit on their behalf a competent programmer to join their small but specialised European sales support group.

Working in a highly sophisticated environment, the successful candidate will be required to take responsibility for supporting salesmen in creating new software for user needs on DEC PDP11/04s in addition to adapting and developing software to drive their equipment of various mainframes.

This is an excellent opportunity for someone with the necessary skills to expand themselves in an unusual but stimulating job. A fair amount of short term European travel will be involved. Also, in addition to salary benefits, etc., a car package will be negotiated for exceptional candidates.

Ref CW/37/6

Industrial Control  
Systems

Programmers/Designers Manchester

ONE OF THE UK'S LEADING SYSTEMS AND SOFTWARE HOUSES needs more staff for its Industrial division centred at Manchester.

Ideally, you should have experience of industrial applications in a manufacturing or process plant environment. A technical or technical application background will also be of interest. Almost all work will be of a real-time nature on mini or micro computing equipment.

Salaries will range from £4.5k to £7k depending on experience.

This is an excellent opportunity for people who wish to join a small but expanding group of professionals working on the building of advanced and often complex computer control systems for both UK and overseas users.

Ref CW/37/2

Programmers &  
Analysts

£4.5K - £8K

Consider the benefits of:

- ★ Working in West London
- ★ Working on communications systems
- ★ Progression to project leadership
- ★ Variety of job content
- ★ Programme development through VDU's

If you are a Programmer or an Analyst and have had exposure to commercial applications (on any hardware), our client would be very interested to learn more about you and discuss your future. They are a well-established software house and offer a career path based on real time earning above average salaries and large company benefits.

Projects are divided into small teams and there are many opportunities for men and women with management potential to gain experience in project leadership at a very early stage.

Ref CW/37/8

Neat/3  
Programmer

West London

£5,000 +

A small but expanding DP department within a group of private companies requires a PROGRAMMER with at least 18 months' experience of NEAT/3 to help them in their planned expansion program.

The installation, an NCR 75 running under B1 Batch, is soon to be upgraded with the introduction of Real-time applications, thus necessitating the change to COBOL as a programming language.

Therefore we would like to hear from Programmers who would like the opportunity of being retrained in Cobol but staying with NCR hardware.

Situated in West London in new modern offices this company can offer excellent career prospects with the usual company benefits.

Ref CW/37/9

## Central Computing Consultants

KINGSTON: 44 Wood Street, Kingston upon Thames, Surrey, England. Telephone 01-549 3212 Telex 27950  
DUBLIN: Canberia House, 24 Lower Leeson Street, Dublin 2. Telephone 789577 (5 Lines)

Licensed analyst by the Dept of Environment No. SE(B) 170

Quota Income Package to £11000  
(Basic c £7,000 plus 2 Litre car)

This is your chance to join one of the trendsetters of the mini computer market. Their products are in the forefront of computer technology and are taking the commercial, industrial and OEM markets by storm. They are an international organisation and are backed by the security and research capability of a 2 billion dollar corporation. Their market penetration is growing rapidly providing career prospects for ambitious self-motivated individuals that you would find hard to beat.

Our Clients, require Sales Engineers to sell computer systems to the OEM and sophisticated end user market in the 5K to 250K range. You will be managing existing accounts and developing new business in this rapidly changing market place. Ideally you will be a professional sales person with above average technical confidence and a proven track record in mini computer sales.

CONTACT: Advising Consultant, David Wade on 061-833 0427 or 0785 56013 after office hours REF CW9/80

**SPECIALIST  
COMPUTER  
RECRUITMENT  
LIMITED**

**SCOR**

**BIRMINGHAM 021-236 3781**  
Freepost, Equity and Law House,  
35-37 Great Charles Street, Birmingham B3 2BR  
**MANCHESTER 061-833 0427**  
Freepost, Blackfriars House, The Parsonage, Manchester M3 8BB  
**LONDON 01-933 0671**  
Freepost 6, 12, Blandford Street,  
London W1E 1JZ

**Computing  
Services  
Association**

## ata Computer Recruitment

A division of ATA Selection and Management Services,  
recruitment consultants to industry and Commerce since 1962.

READY FOR TEAM  
LEADERSHIP?

circa £6,000  
N.W. LONDON

Our clients are a major UK Finance and Leasing group and seek a senior Programmer who is able to make a positive contribution to the development of the new computer section.

It is envisaged that the successful applicant will assume the position of PROGRAMMING TEAM LEADER within 12 months.

The opportunities for further progression are excellent as substantial expansion is planned for the department.

Whilst the ideal candidate should have 2 years' programming experience in BASIC and on PDP.11's under RSTS, applications are invited from programmers capable of building a programming team, preferably with a mini computer background.

For further details ring Steve Morton on: 01-637 0781 or alternatively write enclosing C.V. to: ATA Computer Recruitment, 230 Great Portland Street, London W1N 5HG.

LONDON (01) 637 0781 MANCHESTER (061) 832 5856 BIRMINGHAM (021) 643 1984  
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CW 38/1 Tricia

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S.E. LONDON  
A small but famous International Bank requires mature applicant to take charge of a small team dealing with banking systems re Payment Transfer and Foreign Exchange, so DEC R&M and supervisory experience is a must. Perks are excellent, including free meals and low rate mortgage payments.

CW 38/2 Michael

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Six large, well-established consultancies wish to recruit systems people with all-round experience on third generation equipment and the right personality to deal with clients who require first-rate service. Technical Communications Consultants are also required where in-depth implementation experience of IBM or ICL latest ranges are essential. Excellent fringe benefits and prospects.

CW 38/3 Michael

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Very good career prospects for ICL, GII or GII operators with 1 1/2 years + experience. Excellent relocation package plus non C.P.S. and 4 weeks' holidays.

CW 38/4 Tricia

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W.1  
A multinational organisation with a with-IBM DOS/V3 installation requires top-grade people. Only a two-shift system plus excellent perks which include non-C.P.S., free lunches and 4 weeks' holidays.

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Two major mini manufacturers require experienced salesmen with real-time or process control sales experience. These firms are going places to join now. Quota earning up to 15K in first year plus excellent perks.

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# MANAGEMENT AND ANALYST OPPORTUNITIES

## SYSTEMS ANALYST NORTH LONDON £6000 + Profit share

Major British company who retain ICL 1900 series hardware is expanding rapidly and thus seeks a systems analyst with a minimum of 2 years' systems experience. Position includes a variety of new projects. Ideal applicant will have good commercial systems experience preferably in ICL environment. This is a senior position and is an ideal opportunity for someone to progress further into management.

Challenging position with opportunities in variety of areas.  
Benefits include flexitime, 5 weeks' holiday, free lunch, sports and social club and discount on company products.  
Excellent prospects

Ref. 1783

## TEAM LEADER W. LONDON/BERKS £6000 + Overseas Travel

International group of companies with its outstanding reputation for efficiency, growth and investment seeks a Team Leader to work for one of their autonomous companies. Ideal applicant will have experience on HONEYWELL hardware and 3 years' programming experience in FORTRAN. Successful candidates will be working initially on a new accounting system with a wide variety of new projects planned. This existing and challenging position involves overseas travel for short periods.

Excellent company benefits which include non-contributory pension, life insurance and sickness schemes.  
RELOCATION assistance if required.

Ref. 1715

## PROGRAMMER - DPM £11,000

International company manufacturing sophisticated technical products for world wide distribution seeks programmer for exciting newly created position. Company have recently installed PDP 11 using BASIC 4 and consequently require person with good knowledge of the same, with a good personality and strong desire to accept a challenge.

Prestige company with American backing.  
Good deal of development work using integrated database.  
Excellent prospects and early salary review.

Ref. 1742

## PROJECT LEADER - CITY £2000 + Sub Mortgage

International Financial Institution has a vacancy for a Project Leader to lead a team of consultants with at least 18 months' experience in a similar position. Looking for a person with a proven track record of a significant project preferably in a finance environment. Must have ability to communicate well with all levels of people and able to make and act on decisions. They will IBM hardware and run under DOS/V.

Continued development in a well-planned schedule.  
Scope in a variety of areas.  
Progressive organisation.  
Good company benefits which include sports and social club.

Ref. 1792

## SYSTEMS ANALYST - LONDON £7500 + Sub Mortgage

Highly reputed firm of Merchant Bankers with worldwide business interests are seeking systems analyst with either financial or insurance experience to work as a key figure within their D.P. services division. Ideal applicant should have worked in an IBM installation but other hardware will be considered.

Excellent working environment.  
Job security.  
Full banking benefits including personal bonus.

Ref. 1750

## SYSTEMS ANALYST N. LONDON/HERTS to £7000

Leading insurance company based in North London/Hertfordshire border area is seeking a systems analyst who has programming background preferably in ASSEMBLER and PL/I. The company retains IBM hardware and run under OS. Position involves working in areas of systems performance analysis and systems development. Ideal applicant will have insurance experience, however the company will consider other experience.

Excellent working conditions which include non-contributory pension scheme and subsidised staff restaurant.  
Sub Mortgage after qualifying period of service.  
Job security.

Ref. 1779

## ANALYST PROGRAMMER CITY £6500 + Sub Mortgage

Established Merchant Bankers has opportunity for person with COBOL and PL/I or ASSEMBLER to work as Analyst Programmer. Ideal applicant will be in mid-20s with a degree and preferably will have worked in a financial environment. CICS would be an advantage but training will be offered. This is a super opportunity to follow a good career path.

Excellent scope to move into systems.  
Banking benefits which include low interest loan and excellent sports/social club.

Ref. 1716

## SENIOR SYSTEMS ANALYST EAST LONDON £7000 + Bonus

Our client, situated about 15 minutes from Liverpool Street and easily accessible from Eastern Home Counties, is seeking a senior systems analyst. Ideal applicant will have a programming background in COBOL. Preferably in ICL hardware. Company seeks people with good commercial systems experience, e.g. ledgers, stock control, payroll, etc.

Excellent working conditions which include flex hours.  
Good promotional prospects.  
Comprehensive range of projects.

Ref. 1761

## SYSTEMS ANALYST - LONDON £7500

Exciting and challenging opportunity awaits a Systems Analyst within this worldwide and prestigious company. Ideal applicant will have programming background in COBOL and ASSEMBLER and at least 2 years' systems experience. Our client is awaiting the installation of IBM 370 in October and this is a super opportunity to work in a brand new area on new projects.

Super working environment.  
Excellent career opportunities.  
Recruitment of own team.  
All new development work.

Ref. 1618

## D.P.M. - MIDDLESEX £7000 + Car

Our client, a major British Company with their Head Office in Middlesex, has a vacancy for DPM to be responsible for all aspects of the dept., including prog. and analysis. Ideal applicant will have strong personality, confidence, management capabilities and be able to liaise at all levels. Company retains DEC PDP hardware and seeks person with good programming background. This company offers a fantastic opportunity for young person to progress into management.

Excellent working conditions.  
Security in growing organisation.  
Fantastic fringe benefits.

Ref. 1706

## SENIOR SYSTEMS ANALYSTS CITY

Multinational conglomerate company are seeking senior systems analysts with a minimum 5 years' D.P. experience including commercial analysis in an IBM environment preferably. To undertake responsibility for major project phases. Ideal applicant will have CICS/VS and IMS experience but full training will be given.

Continued development with well-planned schedule.  
Super working conditions including free lunch.  
Varied projects proving an absorbing and interesting career.

Ref. 1791

## SUPPORT ANALYST W. LONDON £6500 + Co Car

One of the fastest growing subsidiaries of an international mini computer manufacturer is moving shortly to brand new offices located W. London, adjacent to tube route. They are seeking an analyst to maintain a high level of back-up technical support within their group. Applicants should be familiar with small/medium mini computers with additional knowledge of IBM VS or System 3 useful but not essential.

Company expect to expand by 50% in coming year.  
Excellent training in BASIC and all hardware/software in their product ranges.  
RELOCATION expenses

Ref. 1709

## CONTRACT DIVISION

For further details ring our London Office 01-734 0152/3010 (24 hours)

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IBM IMS PL/I  
IBM OS COBOL  
IBM OS COBOL TSO  
AN/PROG IBM OS COBOL TSO  
ICL 2903 COBOL

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PDP FORTRAN RSX IM  
PDP MACRO II + COBOL  
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MINI: CORAL MACRO RTL II OR AS6.

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Please write for an application form, or submit a full curriculum vitae, to Bill Swainson, Morgan Guaranty Trust Company of New York, P.O. Box 161, 33 Lombard Street, London EC3P 3BH.

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SCR have been retained to recruit two Systems Analysts on behalf of an autonomous member of a large Commercial Organisation.

The company has achieved an enviable record of success since commencing operation and currently is expanding into the European market.

The commitment to usage of computing facilities is substantial to the extent that they have the use of a dual 2970 configuration which will adequately cater for future development needs.

★ The qualities sought by our client are: ★

- ★ commercial systems experience ★
- ★ the ability to communicate effectively with users to senior management level ★
- ★ dynamic approach to problem solving ★

It is emphasised that the company is a young and progressive concern and therefore considerable opportunities exist for advancement to more senior positions.

All the benefits associated with a large International Organisation can be expected including:

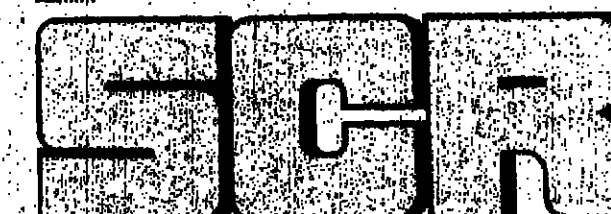
- ★ EXCELLENT RELOCATION PACKAGE ★ NON-CONTRIBUTORY PENSION SCHEME ★
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Interested candidates should contact, without delay:

ANDY CARTER ON: 021-238 3781 (24-hour answering service)  
ON: Lapworth 3272 (Evenings & Weekends)

Ref. No. CW/219

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There are various projects available, ranging from COMPILER writing through to designing and implementing VEHICLE ASSEMBLY CHECKOUT SYSTEMS, each of which is mini/micro based. Why not phone me today, and I will tell you if your background is suitable for any of our current requirements.

Applicants who speak German obviously have an advantage, but for those who do not a special three week course will be arranged at no cost to the individual.

Contact: Andy Wright

Hardware/Software  
Support Specialists

Herts. c.£7,000  
A manufacturer of minicomputer-based systems is expanding its trouble-shooting hardware and software support teams. The work involves understanding customer problems and resolving them quickly and effectively as well as researching new in-house diagnostic procedures. Candidates should have a sound and detailed technical background, ideally on minis, with experience in Assembler and communications systems. Competitive salaries will be offered. Significant scope for further career development in an environment where ability, initiative and willingness to take responsibility is recognised.

Contact: Margaret Stevens

## Analyst Programmer

London c.£7,000  
A large international commodity trading organisation with interests in banking and shipping has an opportunity for an experienced d.p. specialist to set up and run a new installation in London.

The company is looking for a person with all round ability to develop and operate commercial systems on a HP3000. Candidates must have several years experience in a systems and programming environment and be self-motivated to cover all aspects of work in the London Data Centre. This appointment obviously has the potential to offer the senior position as the installation expands.

Salary is negotiable but will not be a limiting factor for the right person.

Contact: Jim Baker

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

**JAMES BAKER ASSOCIATES, International Personnel Consultants**  
16 Maddox Street, London W.1. Tel: 01-491 4478

## Systems Analysts

London up to £7,000  
We have been retained by a large organisation to recruit a number of Analysts to join existing project teams developing advanced real-time applications. Applicants must have at least three years experience in a d.p. environment with the last year spent in the analysis/design of transaction based systems. Knowledge of database and real-time would be a distinct advantage. Exceptional opportunity to be involved in the design of sophisticated and unique systems. Salaries according to experience. Non-contributory pension scheme.

Contact: Jim Baker

## Basic + Programmers

London SE1 start c.£5,500  
Due to our client's continued success in providing bureau services and turnkey systems to the legal and professional world, their Development Department now has two further vacancies for programmers with at least 18 months BASIC or BASIC + experience. Applicants should preferably have a PDP 11 and RSTS/E background.

The group is responsible for software development and technical support both to the company and its clients, and plans for the immediate future include developing applications for various MICROS and as well as for the PDP 11's already on-site. Superb promotion opportunities to Systems Analysis and Project Management - possibly within a year of joining for the most able. Profit sharing scheme, free Life Insurance also available.

Contact: Andy Wright

## Engineers - Field Support

All areas up to £6,000 + car  
Several of our clients, mainly mini/micro computer suppliers or manufacturers, seek experienced Field and/or Support Engineers. Generally, the work involves dealing with a variety of problems associated with hardware and diagnostic software.

## — Hardware and Software Design

London and Home Counties up to £7,000  
There are excellent opportunities for design engineers to identify, develop and implement mini/micro computer based systems. Experience in either digital electronics, Assembler data communications, analogue interfacing or real-time systems is essential. The facilities available within the department include LSI 11, Intel and RCA micro-computers and DEC systems. All positions offer excellent remuneration packages, career prospects and work involvement.

Contact: Margaret Stevens

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We also have other vacancies for COBOL, PL1 and ASSEMBLER programmers of 2+ years' experience and good opportunities for 360/370 operators.

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Company benefits are excellent and include free BUPA and non-contributory pension. Relocation is possible.

This is a key role in the new manufacturing plant at Wokingham providing software support to the European manufacturing area. This will involve assisting system level technicians in diagnostic and operating system check-out, and generating total software packages to customer specifications. Ideal candidates will have about five years experience of software design, support or troubleshooting.

We need two highly experienced software designers to establish the development and maintenance of all new communications products at Wokingham. Each will have the ability to take a product through to implementation either as an individual or team leader. Experience is desirable in communications, operating systems, assemblers, emulators etc., at a design or support level.

This is a Coventry-based job providing highly technical software support to clients throughout the UK. This requires a detailed background of operating systems and systems software, preferably in a real-time communications environment, and a desire to work in a troubleshooting capacity.

For further details ring ANNE CAMPBELL at (0734) 781178 or send a resume to her at MODULAR COMPUTER SERVICES, Broad Street, Wokingham, Berkshire

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RECRUITMENT CONSULTANTS

POSITION	SALARY	EMPLOYER	LOCATION	HARDWARE ENVIRONMENT	SOME OF THE QUALIFICATIONS	REF. NO.
COMPUTER MANAGER	to £9,700	GOVERNMENT	N. MIDDX.	IBM	Required to control, co-ordinate and develop computing work, proven managerial success essential in heading large team. Technical competence in both hard and software and financial ability.	38/1
SALES CONSULTANTS	Neg.	ELECTRONICS	U.K./EUROPE		Applications are invited from people with proven sales success, who have a working knowledge of IBM tele-processing concepts.	38/2
SENIOR ANALYSTS	To £6,500 + Car	SERVICE INDUSTRY	S. MIDDX.	ICL 1900	With five years' systems experience to act as project leader on a wide range of applications including all project work undertaken is to group DP standards and responsible for maintenance of project time-table and budgets. Also expected to participate in the analysis of a wide range of business problems and solutions.	38/3
SYSTEMS PROGRAMMER	£7,500	CONSULTANCY	SURREY & MANCHESTER	MINIS	Applications are invited from candidates who will apply their experience of mini computer assembler programming and knowledge of operating systems or compilers for systems maintenance and development.	38/4
ANALYST/PROGRAMMERS	to £18,000	SYSTEMS HOUSE	W. GERMANY	MINIS	Qualified analyst/programmers with experience of writing real-time software on a variety of interesting and demanding projects. Preferably working knowledge of German.	38/5
CHIEF PROGRAMMER	c. £6,500	MEDICAL TRADE	N. SURREY	1800/2900	Candidates should have at least five years' experience of programming ICL 1800/2900 tape and disc hardware. He/she must also have proven supervisory capabilities and will lead a programming team.	38/6
ANALYST PROGRAMMERS	£4,500-£6,000	TOY MANUFACTURERS	S. LONDON	PDP-11	Applicants should have real experience in commercial, scientific or industrial applications with RSTS/E and have the capability to act as Team Leaders, involving direct user contact systems design and programming responsibility.	38/7
PROGRAMMER	c. £4,000 + Benefits	CONSULTANCY	EC2	IBM	Probably educated to "A" level standard and used to working in a commercial environment with 12 months' COBOL programming experience in either an OS or DOS installation.	38/8
COMMERCIAL SOFTWARE SUPPORT ANALYSTS	c. £6,500 + Car	MANUFACTURER	E. BERKS.	MINIS	Due to rapid expansion top calibre people are required to service the growing base of commercial installations. Applicants should be over 25 with four years' experience of COBOL and other commercial software, e.g. ISAM, TP or DBMS. Knowledge of assembly languages and OS software advantageous.	38/9
PROGRAMMERS	To £5,400 + Bonus + Mortgage +	INTERNATIONAL BANK	E. LONDON	IBM 370	Programmers with about two years' experience who after a period will be capable of taking Team Leader responsibilities. The major language is PL/I but will consider those with experience in other languages for retraining. Experience of CICS an asset.	38/10
SERVICE CONSULTANTS	A1 Neg.	SYSTEMS AND SOFTWARE HOUSE	MUNICH		A senior consultant with a strong background in COBOL and at least two other languages required to help with the co-ordination of high level language facilities. A knowledge of German would be a distinct advantage.	38/11
PROGRAMMERS/CONSULTANTS	To £8,000 +	TECHNICAL CONSULTANCY	SURREY	MINIS MICROS	This rapidly expanding consultancy requires staff at all levels to work on advanced software/technical applications in the area of communications, real-time process control, and basic software.	38/12
ANALYSTS PROGRAMMERS	To £8,500 +	SOFTWARE HOUSE	W1	ANY	Excellent career prospects for ambitious Analysts and Programmers with minimum of one year's commercial experience to join this well established organisation.	38/13
COBOL PROGRAMMERS & ANALYST PROGRAMMERS	To £10,000 & To £15,000 + Benefits	MANUFACTURING COMPANY	AMSTERDAM	370/125	Our clients have an IBM 370/125 operating under DOS/VSE and are looking for proven experience in on-line systems (using CICS), Financial Administration and Stock Control. Experience would be advantageous.	38/14
PROGRAMMER/ANALYSTS	c. £5,500 + Flexitime	PETROCHEM	EC2	UNIVAC 90/60	Three years' experience of COBOL programming, preference will be given to candidates with experience of programming on-line applications. Preferred age range 25-30.	38/15
COBOL PROGRAMMERS	c. £5,500 + Expenses	AIRFREIGHT FORWARDER	UK/EUROPE	MINIS	Based in South Midx., the work involves extensive travelling for experienced programmers to help install minis at European locations.	38/16
SYSTEMS ANALYSTS & PROGRAMMERS	To £8,000 + Benefits	FOOD RETAILERS	KENT	370/138	Enquiries are invited from candidates with experience of the following: on-line systems under CICS; Database IBM DB/1; modelling, forecasting and simulation; Point of sale data capture; high level languages COBOL or PL/I; B18, APL.	38/17

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Successful people and organisations rarely achieve such prominence by accident. They share an enthusiastic drive and sense of purpose, and they have an ability to react to market pressures at both an individual and company level. Organisations achieve sustained success by providing an environment in which professionals can rapidly develop to their greatest potential and gain the increasing rewards that go with superior performance. The really outstanding individuals recognise such an environment and take advantage of the opportunity to become part of it.

There is a singular opportunity for success today in computing and in Tymshare, particularly, for choosing to follow a career in marketing. We are seeking people who set their sights high, newcomers or those who have already established a track record and are ready for the next level of success.

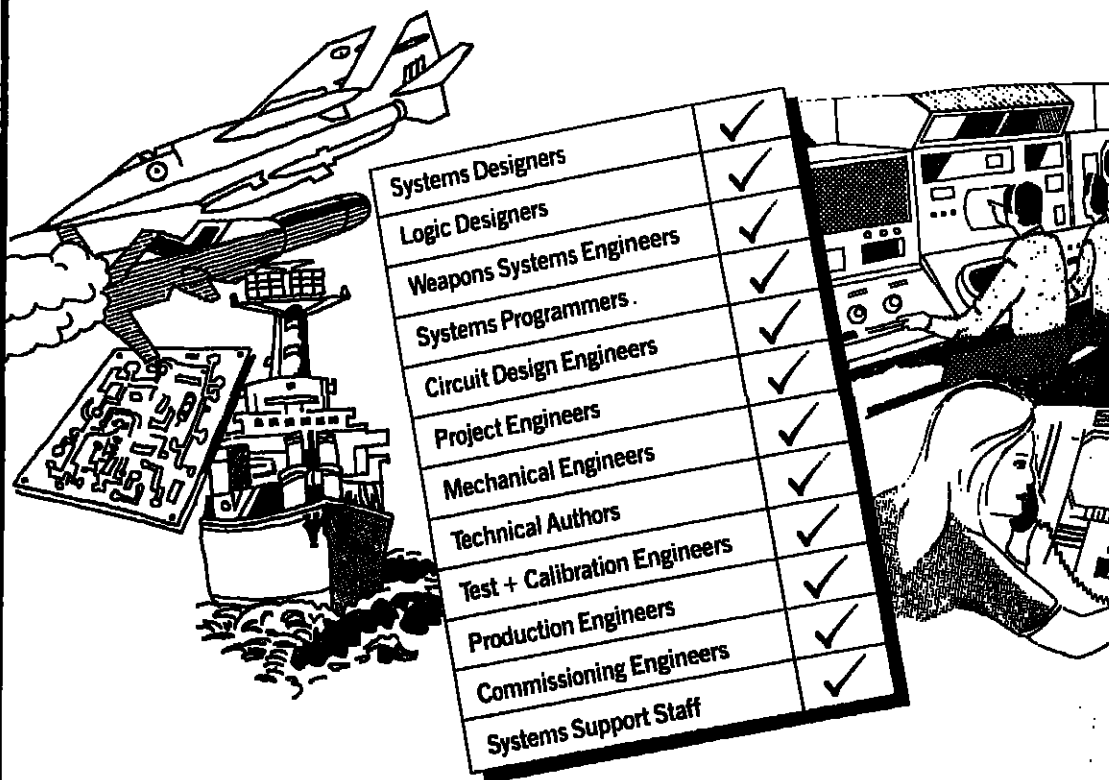
Tymshare was one of the earliest entrants to the time sharing market in 1960, since that time the Company has grown to 60 computer systems, about 45 of which are performing time-sharing and remote computer functions. Sales and service offices operate throughout America, the United Kingdom, Western Europe and Japan. The Company employs over 2500 people, with approximately 25% engaged in marketing functions.

Tymshare UK's front line Sales Executives introduce the Company and its services to the market-place. These field marketing professionals establish new customer accounts, and expand existing user business by providing an off-the-shelf answer or a custom package tuned to the unique situation presented by a customer. The objective is to furnish the customer a means of direct access to accurate up-to-the-minute information that makes the vital decision making process a quicker and surer one.

A sales or systems background in computer hardware, software or services is a basic qualification in Tymshare's marketing organisation. Candidates are also expected to have a basic understanding of business management functions. For a more detailed account of the Company's current vacancies in Central London contact their Consultants.

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If you would like to apply for these positions, or you would like more information, please write, including your c.v. to:-

Mr. Ian Hume, Personnel Services,  
NCR Limited Engineering & Manufacturing,  
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Applicants must have a BSc in Electronics or Electrical Engineering or an equivalent qualification.

A letter should state the free salary of around £10,000 and accommodation in Jeddah, Saudi Arabia, to be provided by the employer.

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Required with experience of time sharing systems to join a young and progressive operations group in the Computer Centre, Chelsea College, University of London. An understanding of the system would be an advantage. The salary is £4,300 per annum, currently rising to £4,500 per annum.

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For further details contact:  
**Adrian Cubitt**  
Telephone No: RAYLEIGH (0268) 747502  
Falmer Jeans Limited, Claydons Lane, Rayleigh, Essex

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Ref. W2/2109

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Applicants should possess:-

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- Field installation and commissioning experience

Responsibilities will include the preparation of engineering proposals, technical system evaluation with clients and suppliers, and engineering involvement through to job commissioning.

Although based in the UK, some travelling overseas will be required. A degree/HNC is preferred but consideration will be given to others with extensive experience.

A salary will be offered commensurate with the importance of this position, together with an excellent range of company benefits. Relocation costs will be paid where appropriate.

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Please write, giving full career details and quoting reference GRS 488 to David Macmillan, Personnel Advertising Limited, 22 Red Lion Street, London WC1R 4PX. Please specify any companies to which your letter should not be sent.

University of London: London School of Economics

### Research Officer or Fellow LEGOL Project

Applicants are invited to submit a paper at Research Officer or Fellow on LEGOL 2. The project is concerned with advanced techniques for information analysis and research into the fields of systems design, database automation, legal analysis and the theory of formal organisations.

LEGOL 2 is a high-level language for specifying a data processing system and it also enables rules, such as one logic or standard law, to be expressed in a form which a computer can interpret.

The person appointed must be a very able programmer in order to play a major role in designing and leading an interdisciplinary team.

An interest in one of the fields mentioned above would be an advantage. The work will provide ample opportunity for original research at the Ph.D. level.

The appointment will be for one year in the first instance at a salary in the range of £3,863 to £6,555 or £6,317 to £7,754 per annum plus £450 per annum London Allowance, depending upon qualifications, age and experience. It is to commence as soon as possible.

Application forms and further particulars may be obtained from the Administrative Services, Room MB10, The London School of Economics, Houghton Street, London WC2A 2AE. Closing date for applications: 9th October 1978.

## SYSTEMS MANAGEMENT

MERSEYSIDE

### SYSTEMS MANAGER £6,500

### PROJECT LEADER £5,700

Our client is a substantial organisation and household name in the leisure industry, with a multi-million pound turnover. Already a sophisticated IBM computer user, current objectives create the need to strengthen the management team with two data processing professionals.

The work is heavily biased towards development including TP applications, and further development in both on and off line systems operating under CICS/VS and OS/VS1 is envisaged.

#### SYSTEMS MANAGER

The incumbent will initially work closely with external software consultants in the redesign, installation and commissioning of both new and existing systems. Ideally, applicants should have management experience, but this is an excellent opportunity for a person with a solid systems background, currently working at Project Leader level, to begin a management career.

#### PROJECT LEADER

Must be capable of leading a small team and of understanding complex problems. Solutions will be innovative but practical for users. The Project Leader is expected to assume the responsibility of running a technical team and of controlling and implementing projects within timescale and budget.

#### LOCATION

The company is situated 5 miles outside Liverpool, with easy access to beaches and countryside. Housing is reasonably priced and relocation will be paid where applicable. The department consists of some forty people and has a lively and friendly atmosphere.

All replies (male or female) should be addressed to our Managing Consultant, at our MANCHESTER office. Please quote reference: CW 34-8C.

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Tel: High Wycombe (0494) 33499

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(Ref. M31)

Salary: Up to £5,608 p.a. inclusive.

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You will then have the opportunity to gain lots of practical experience over a wide range of projects and areas. The computer centre is located close to the tube and main line stations as well as major bus routes.

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Further information or application form obtainable from the Personnel Officer Directorate of Management Services, London Borough of Lambeth, Lambeth House, London SW2 or telephone 01-274 7722 ext. 688. Closing date 2nd October, 1978.

**LAMBETH**



## NEW ZEALAND Christchurch ANALYSTS AND PROGRAMMERS

THE COMPANY is a New Zealand's major manufacturing organisation in the garment and textile industry. Their head office is situated in Christchurch. They have branches, sales offices, and manufacturing units throughout New Zealand with associated offices in Australia and the United States.

**THE INSTALLATION** - Situated in the centre of Christchurch, currently operating on ICL 1904T with EDS 60s and on line data entry, planning for conversion to 2910 is currently being undertaken.

**VACANCIES** - they require experienced analysts and programmers to join their development team.

**Qualifications** - applicants must have - a proven record of achievement in implementing major systems.

A professional approach in the art of client liaison. Previous ICL 1900 experience desirable - 2900 experience would also be an advantage.

Ability and personality to work in a team environment.

**REWARDS AND BENEFITS** - excellent commencing salary - commensurate with applicant's experience and ability. Assistance with relocation expenses to New Zealand, and assistance with accommodation on arrival. Staff superannuation scheme after qualifying period.

Our client will be visiting the United Kingdom for the purpose of interviewing prospective applicants during the first two weeks in September, 1978. In the first instance, please contact our associates.

Chad Stolper, Prescott Computers Limited, 6 Bloomshay Square, London, WC1. Telephone: 01-242 2142.

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## Technical Programmer

LONDON SE1

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A Technical Programmer is required for work on mini-computers used in power stations and by research staff for monitoring plant and collecting data. At least one year's practical experience in programming for PDP11 or similar computer, preferably on real-time systems.

Salary within a scale ranging from £1414 to £2735 per annum according to qualifications and experience.

The minimum qualification for this post is 'A' level mathematics, and a degree or professional qualification would be preferred. Appropriate subjects would be computing science, mathematics, physics, economics, electrical/electronic engineering.

Applications quoting Vacancy Number 1390/78/JEE giving full details should be forwarded to the Personnel Officer (P/Personnel),

Central Electricity Generating Board,  
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London SE1 8JU to arrive by  
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South Eastern Region

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A Systems Analyst is required to work on a complete review of all systems in the operating companies. A minimum of two years systems experience is required but the ability to work on own initiative and liaise at all levels within the division are of paramount importance. There will be deep involvement in projects from feasibility through to implementation.

If you have the necessary qualifications and would like to be considered for this position, please call in or phone for an Application Form. Ames Personnel, Suite 14, Dryden Chambers, 119 Oxford Street, London W1R 1PA.

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Responsible to the Financial Systems Manager, the holder of the post will be involved with 8858 Data Entry Computing Systems and computer links to ICL Computers (1900 and 2800 Series). It is essential that applicants have COBOL programming experience and ideally, eighteen months Systems Analysts experience relating to ICL machines.

Applicants are invited from men and women and should be made in writing, giving details of age and experience.

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## PERIPATETIC TEACHER

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Applications by letter to

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## SENIOR SYSTEMS ANALYST

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The Company has recently set up their European operation in Wokingham and are a well established small machine manufacturer. The position offers an excellent starting salary together with a non-contributory pension, free BUPA and negotiable relocation expenses.

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A well known Continental manufacturer and distributor of industrial and medical gases and related equipment seeks an experienced manager to control its Computer Department.

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of all existing procedures is anticipated. Whilst the work can be performed in English, a facility for languages is desirable.

This position offers an outstanding challenge and salary. Fringe benefits, which are negotiable, will fully reflect its importance. Whilst the recruitment of a full-time manager is preferred, the Company is prepared to consider candidates wishing to undertake a 2 to 3 year contract for the completion of the necessary development work.

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Computer Personnel Consultants

## OPERATIONS MANAGER

NEW INSTALLATION

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Neg. c. £6000 + Car

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Development plans include a comprehensive financial accounting system and stock and production control systems. Once implemented for companies within the group it is planned to market these systems to outside users offering computing services on a bureau basis.

We wish to appoint an Operations Manager to take complete responsibility for setting up and managing all aspects of the operations department including budgetary control and staff management.

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Ref. E1/2109

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# Computer Professionals

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### Systems Analyst/Programmer

up to £12,000

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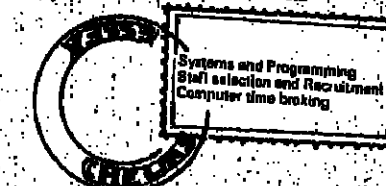
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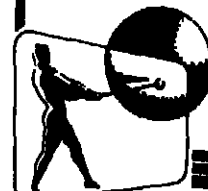
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their selling experience, in-  
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likes and dislikes. By far the  
most common dislike is  
"cold-calling", prospecting,  
pioneering, cold canvassing,  
call it what you will. To  
most it is demotivating; to  
many it is a necessary  
chore. Very few find it a  
stimulating and rewarding  
process - but it can be. It is  
merely a matter of doing it  
right, based on good  
strategy and common  
sense.The most important  
aspects are "vertical mar-  
keting" and good sources of  
reliable company informa-  
tion. Vertical marketing is  
simply the process of con-  
fining activity to a particu-  
lar application within a  
specific industry. Prospecting  
is so much easier and  
effective when it is carried out  
in this fashion. The sales-  
man soon develops an  
appreciation of the prob-  
lems and opportunities  
with his chosen market sec-  
tor which in turn gives him  
greater confidence and thus  
he is more likely to achieve  
success.There are many sources  
of information to call upon  
and these can be divided  
into two categories:  
1. Identification of pos-  
sible business opportunities.  
2. Company information  
for the purpose of construct-  
ing a selling strategy.  
One of the best sources of  
new business is existing  
clients. I don't mean  
"Please Mr Customer will  
you have some more" -  
that is for account  
managers and sales support  
analysts. It is the process of  
discovering from a satisfied  
existing client who else in  
this particular industry or  
locally might have a  
requirement for similar data  
processing methods. You  
will be surprised how well  
informed your client is,  
often to the point of  
naming the best to contact.Press articles, both the  
national Press and trade  
journals, are also a good  
source of information, and  
for salesmen selling  
peripherals, software, con-  
sumables, etc, recruitment  
advertising is a good source  
of specific prospects.  
Trade associations are  
another good source of  
information. The telephone  
operator of an identified  
prospective, particularly  
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taries, can also provide  
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Thus, and with real mar-  
keting knowledge in the  
form of defined prospects  
and company information,  
the salesman is ready to  
pick up the telephone and  
make his first call to the  
prospective. The objective is to  
make an appointment.There are four directories  
which are of considerable  
value to salesmen within  
the computer industry:

1. Computer Users' Year Book
2. Dun and Bradstreet
3. Kompass
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Another good source of  
information is the telephone  
operator of an identified  
prospective, particularly  
regarding the names of  
specific individuals. Secre-  
taries, can also provide  
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you treat them right.Thus, and with real mar-  
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testing and implementation. Experience of hard-  
ware evaluation, implementation and facilities  
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will be able to demonstrate a record of achievement in relevant  
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The Computer Professionals



## DATA PROCESSING MANAGER

Salary on Grade 10 £15,000 p.a. plus annual increments of £1,778.

Applications are invited for this post within the Treasury's Department based at Epping.

Present data processing facilities are via key-tape link with mainframe computer at Essex County Council, Chelmsford. Through an on-line replacement has been made. Current developments in Essex have involved replacing key-tape equipment with Level 6 on-line equipment with supporting visual display units.

The successful applicant will be responsible for forward planning and future developments of the computer link and general oversight of the running of the Computer Section. He/she will have to ensure that the computer and other departments are able to plan and control the activities of staff working to a strict timetable.

Experience at senior level in managing a data processing installation is preferable but failing this a wide knowledge of current computer usage, experience in staff control and knowledge of a high level programming language (preferably COBOL) will be required.

Assistance with housing may be available and reasonable removal expenses will be paid.

Application form and job description may be obtained from the District Personnel Officer, 323 High Street, Epping, Essex CM16 4BE (telephone: Epping 77344, Ext. 201).

Please quote ref: T/24.

Closing date: 24th July, 1978.

**Epping Forest District Council**

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## Senior Systems Designer

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We currently have a vacancy for a Senior Systems Designer. Applicants for this position should have extensive systems analysis experience and preferably programming experience. The ability to plan, control and implement projects on a self-motivated basis is essential.

A competitive salary will be paid and there are attractive conditions of employment including a contributory pension scheme and 4 weeks annual holiday.

Written applications to

The Personnel and Training Manager

SIMPLICITY PATTERNS LIMITED

Blantyre

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Tel: Blantyre 826900

**Simplicity-Style**

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If you feel that you can contribute to our expansion, contact Helen Hackett, Personnel Officer, Atkins On-Line, Fourmoor House, 12-22 West Street, Epsom, Surrey. Tel: Epsom (STD 037 27) 29878... AND FIND OUT MORE.

**Atkins On-Line**

## Ascii through the Logic Gate

An epic in 32K words, by Richard Forsyth  
Block 6 (Round The Block)

Hex, Cleo and Ascii have left their mountain sanctuary while it is still light, largely at Cleo's insistence. They hope to recruit Cleo's sister Lumbard and her friend Zan Zapper to their cause.

HALF way down the hill they paused. Hex had decided that Ascii should go off independently on an alternative route. That way, if they were being trailed, their tracks would be harder to follow. So Ascii set off on his own, programmed to meet them at a pre-arranged point near the San Guine research establishment. He rapidly out-distanced them.

They walked on.

"Sam?"

"Yes."

"She means a lot to you, doesn't she?"

He looked askance. Her persistence was getting on his nerves. "Are you bringing up the subject of Simula again? I thought I told you to lay off."

"I was just thinking that she's treated you badly but it hasn't stopped you dreaming about her."

"Good and bad treatment doesn't enter into it. Simula is pure code. Therefore, she is bound to be both shurable and re-entrant. But being a human, you wouldn't understand."

Cleo nodded sagely, and with a touch of disappointment. She had understood all she needed to. Much to Hex's relief, she was content to let the matter drop.

They had now reached the foot of the mountain. Presently they came to their first sign of habitation, an orchard where Cleo stood on Hex's shoulders to pick some apples which they greedily devoured. Then they wriggled out through a gap in the hedge and found themselves at the edge of a road. Hex's first reaction was to dive back under the hedge for shelter; but Cleo stood boldly at the roadside, gesticulating.

"What in the name of George Boole are you doing?"

"I'm hitchhiking. You don't mean to walk all the way, do you?"

Hex spread his hands out and looked skyward imploringly. "We might as well go straight to Error Squad HQ and give ourselves up," he sighed, more to himself than to the girl.

The roar of an internal combustion engine became audible in the distance. Cleo pointed excitedly down the road. "Here comes our first lift," she said, and stuck out her thumb.



Hex trained his eyes on the spot. Soon he could make out a humanoid figure astride a large black motorbike, with what appeared to be streamers trailing out behind in the wind. As the apparition approached, Hex saw that it was an android and that the streamers were in fact lengths of paper tape that he had wrapped round his neck in the fashion of a scarf.

"He's slowing down," cried Cleo. "Come on Sam, don't just stand there. Let's get aboard."

The stranger brought his vintage 4-cylinder Harley Davidson to a halt just short of where they were standing. He wore an open necked silk shirt with a colourful floral pattern, purple velvet trousers and a pair of long black boots. He took off his crash helmet and swept away the paper tape wrapped round his neck.

"Good afternoon, what can I do for you?"

"San Guine or bust?" Cleo blurted out. "We have to be there by nightfall."

The stranger eyed them quizzically. "With whom precisely do I have the honour of speaking?"

"I'm Sam Zalk of the experimental programming lab," lied Hex, "and this is number 0681. She's only a human; so she doesn't have a name."

"Charming," replied the other. "Allow me to introduce myself: I am James Hock, renowned systems analyst and motorcycle mechanic, inventor of the revolutionary word processing package PUFTA (Procedure Used For Text Analysis). You are in luck because not only am I travelling on a minor road very rarely used, but in fact I happen to be on my way directly to San Guine on a matter of urgency."

"We'd be most grateful if you could take us there," said Hex politely. "I'm afraid we're rather stranded since we've been out camping in the wilderness."

"How frightfully heuristic!" exclaimed Cleo in a condescending tone. "I can assure you that I've done more camping in my time than you've had cold breakfasts." He took Hex aside and spoke in a confidential undertone. "Nothing would give me greater pleasure than to transport you and, er, 0681 swiftly to your destination; but, as you can see, my steed was built for two only."

"This is magnificent," called out Cleo who had walked over to his machine and was scrutinising it with genuine admiration.

Hock continued. "Speaking as android to android, why don't you come with me and leave the human behind? She can get the next ride."

"No thanks. I appreciate your offer; but we don't want to split up."

"A noble sentiment — but where will it get you? Look at me, fifth cousin twice removed of the celebrated Charles Babbage, creator of the finest text handling and information retrieval system on the market, and what do I get? I am spurned, mocked, a laughing stock. Why? Because I am being of principle, a stickler for the old fashioned courtesies, as I can see you are."

Hex found himself the object of an uncomfortably sugary smile. The idea of a queer android was new to him; but he saw no reason to put a stop to the tide of compliments that was evidently about to gush over him.

"No, my friend," continued Hex in a grave and philosophical manner, "the age of chivalry is dead."

Just then he broke off, startled by the throaty roar of his own vehicle. Cleo was sitting in the saddle and had kicked it into life. As she drew alongside she called out: "Quick, Sam, jump!"

With a hop and a leap Hex was on the pillion seat, clinging on for dear life as she threw open the throttle and the motorbike accelerated at breakneck pace down the centre of the small country lane towards San Guine.

"It's a good thing you've got me to look after you," she managed to say over her shoulder, her words clipped and almost lost in the slipstream.

Hex couldn't resist a snigger.

Wherever next? Next stop was downtown San Guine.

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